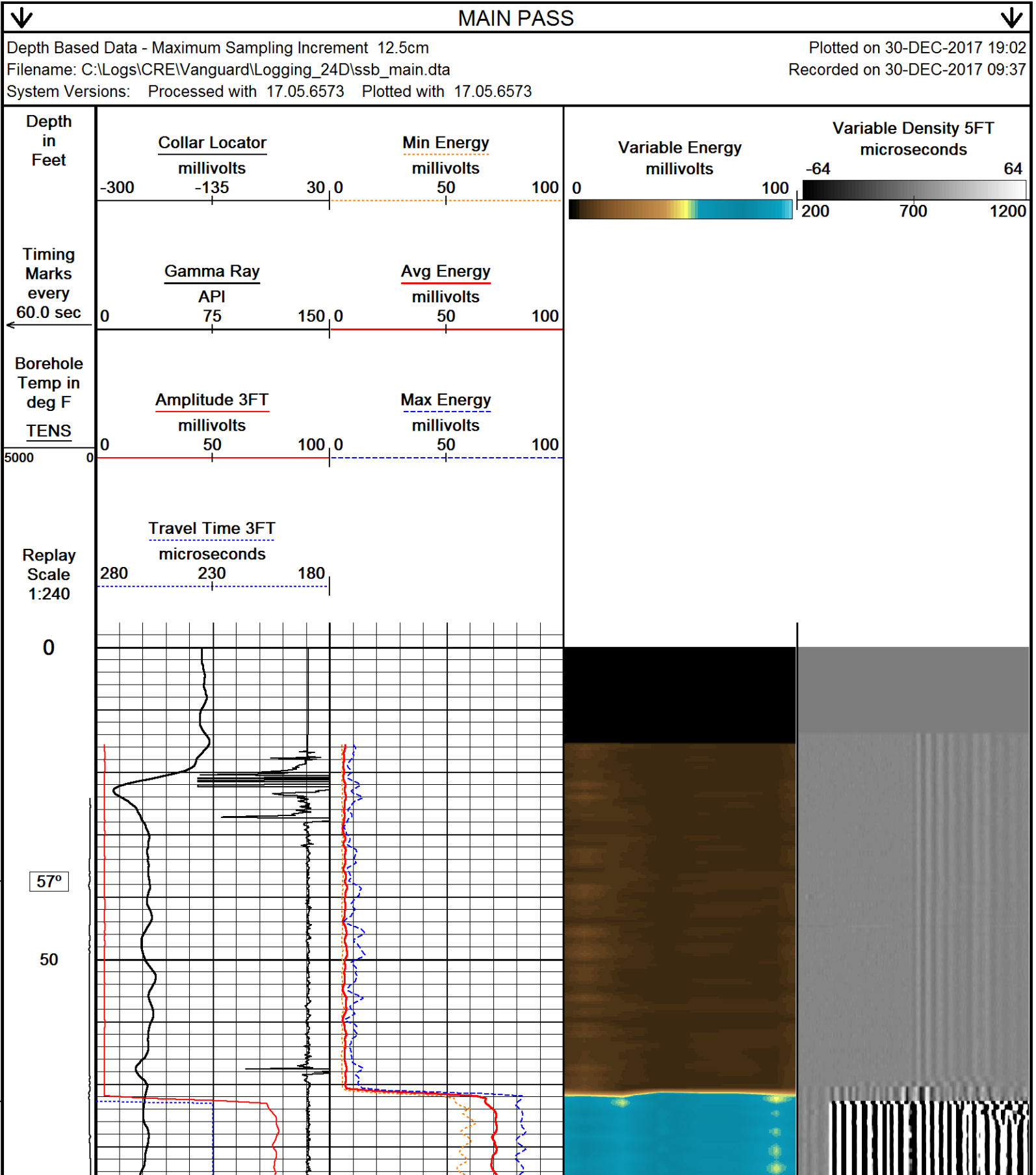
 <b>Weatherford®</b>			<b>SECTOR BOND</b>		
COMPANY WELL FIELD PROVINCE/COUNTY COUNTRY/STATE LOCATION			VANGUARD OPERATING LLC. FEDERAL GGU 24D-28-691 MAMM CREEK GARFIELD U.S.A./COLORADO		
SEC 28	TWP 6S	RGE 91W	Other Services		
Latitude			RAPTOR		
Longitude			PRESSURE		
API Number	05-045-23531		TEMPERATURE		
Permanent Datum :Ground Level, Elevation 6130.6 feet			Elevations:		
Log Measured From KB, 17.00 feet above Permanent Datum			KB 6147.60		
Drilling Measured From KB			DF 6130.60		
GL					
Date	30-DEC-2017		PERFORATION RECORD		
Run Number	ONE		Shot	Number	Depth From
Service Order	5839-201768924		Density	of Shots	Depth To
Type Log	CRE				
Depth Driller	7660.00				
Depth Logger	7578.50				
Top Log Interval	0.00				
Bottom Log Interval	7568.00				
Hole Fluid Type	WATER				
Hole Fluid Level	72.00				
Restriction ID	4.000				
Max Recorded Temp	211.00		Gun Type		
Well Head Pressure	0.00		Gun Size		
Well Head Equipment	PackOff		CASING / TUBING RECORD		
Time Well Ready	0700		Size	Weight	Depth From
Time Logger Bottom	0800		inches	pounds/ft	Depth To
Unit	14115/15108		8.625	32.00	0.00
Equipment Name	CRE-SSB		4.500	11.60	0.00
Base	CASPER, WY				
Recorded By	A. TAYLOR				
Witnessed By	R. SNOW				

CASING / TUBING RECORD						
Type	Grade	TypeJoint	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
			8.625	0.00	825.00	32.00
	HCP-110		4.500	0.00	7629.40	11.60

REMARKS
<p>Logged with WLS v 17.05.6573 via WSS-E</p> <p>Intervals logged and presented at clients request.</p> <p>Low logging speed adversely affect CCL downhole. Low logging speed required for CRE/Raptor logging in NVision mode.</p> <p>Bond log logged in combination with CRE/Raptor from TD to 3700'. Bond log logged without CRE/Raptor from 3700' to end of interval without CRE/Raptor energized.</p> <p>Depth correlated to marker joint at 7453' from log supplied on location (RMWS Temperature/GR/CCL Log; 12-18-2017)</p> <p>Sector bond tool ran in combination with CRE/Raptor.</p> <p>Gamma Ray measurements and repeatability adversely affected by presence of operational pulsed neutron tool (CRE/Raptor). This is not indicative of a malfunctioning tool.</p>

In interpreting, communicating or providing information and/or making recommendations, either written or oral, as to logs or test or other data, type or amount of material, or Work or other service to be furnished, or manner of performance, or in predicting results to be obtained, the Contractor will give the Company the benefit of the Contractor's best judgment based on its experience and will perform all such Work in a good and workmanlike manner. Any interpretation of test or other data, and any recommendation or reservoir description based upon such interpretations, are opinions based upon inferences from measurements and empirical relationships and assumptions, which inferences and

interpretations, are opinions based upon inferences from measurements and empirical relationships and assumptions, which inferences and assumptions are not infallible, and with respect to which professional engineers and analysts may differ. ACCORDINGLY ANY INTERPRETATION OR RECOMMENDATION RESULTING FROM THE SERVICES WILL BE AT THE SOLE RISK OF THE COMPANY, AND THE CONTRACTOR CANNOT AND DOES NOT WARRANT THE ACCURACY, CORRECTNESS OR COMPLETENESS OF ANY SUCH INTERPRETATION OR RECOMMENDATION, WHICH INTERPRETATIONS AND RECOMMENDATIONS SHOULD NOT, THEREFORE, UNDER ANY CIRCUMSTANCES BE RELIED UPON AS THE SOLE OR MAIN BASIS FOR ANY DRILLING, COMPLETION, WELL TREATMENT, PRODUCTION OR FINANCIAL DECISION, OR ANY PROCEDURE INVOLVING ANY RISK TO THE SAFETY OF ANY DRILLING ACTIVITY, DRILLING RIG OR ITS CREW OR ANY OTHER INDIVIDUAL. THE COMPANY HAS FULL RESPONSIBILITY FOR ALL DECISIONS CONCERNING THE SERVICES.



57°

100

57°

150

58°

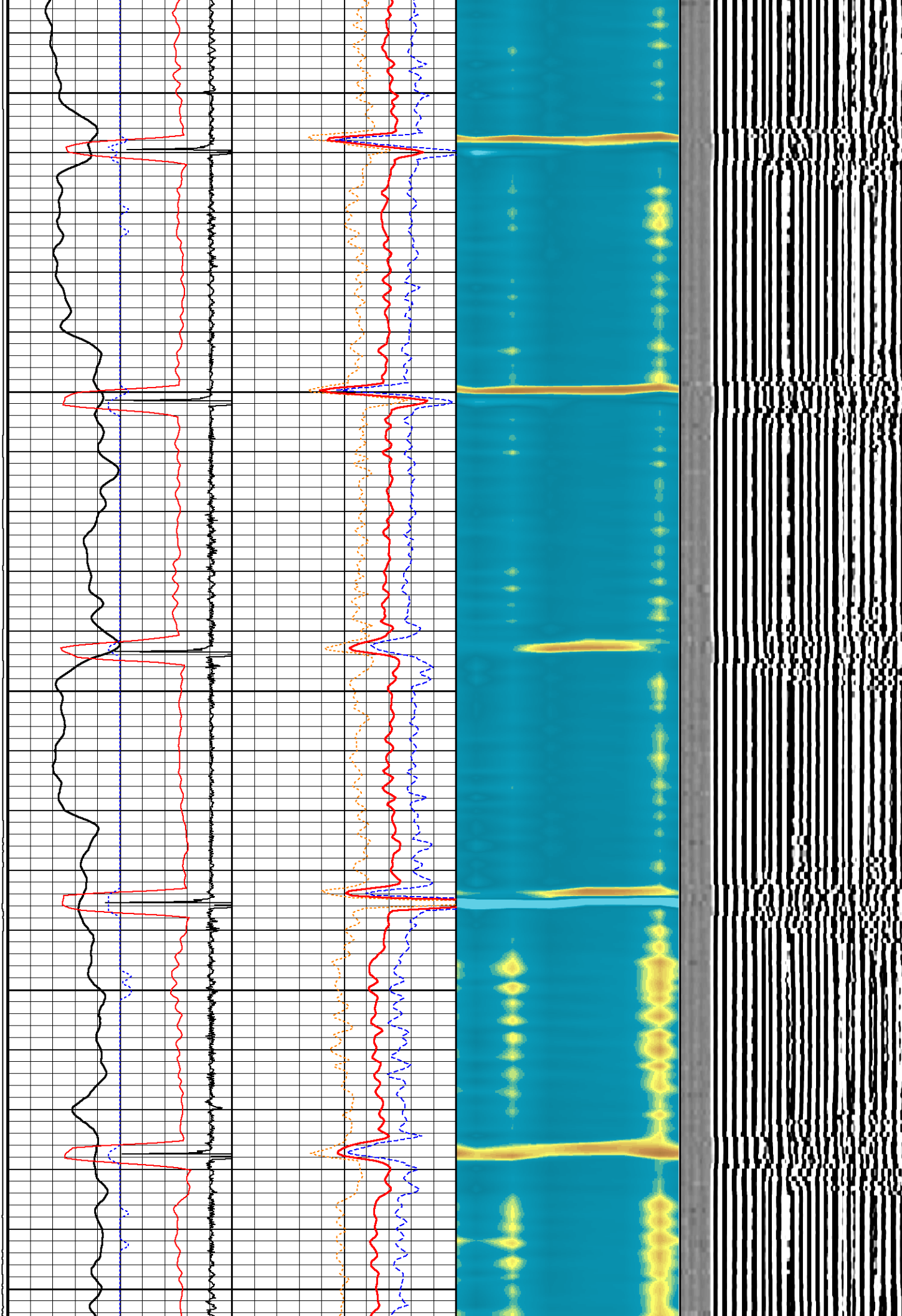
200

58°

250

59°

300



60°

350

61°

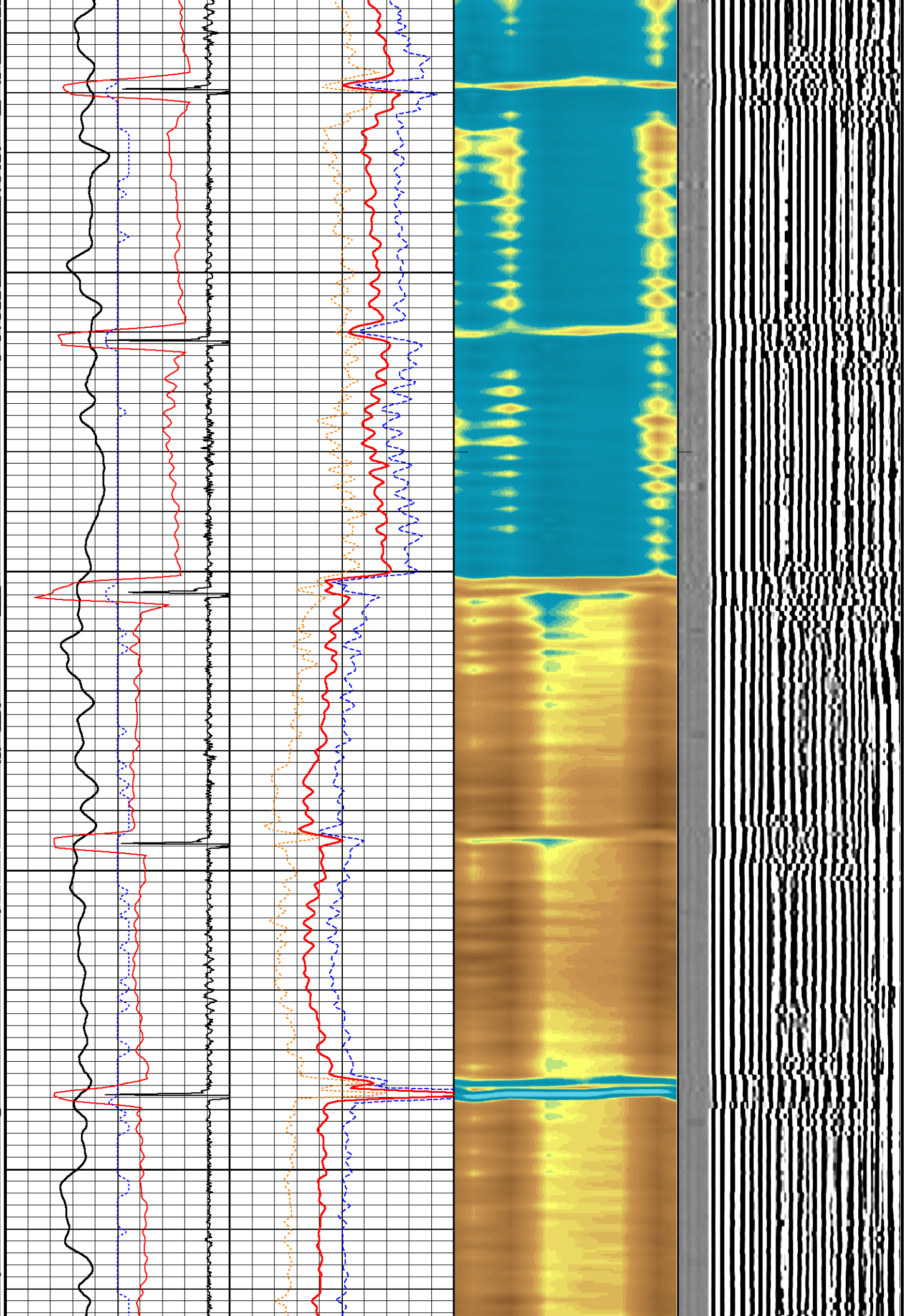
400

62°

450

63°

500





64°

550

65°

600

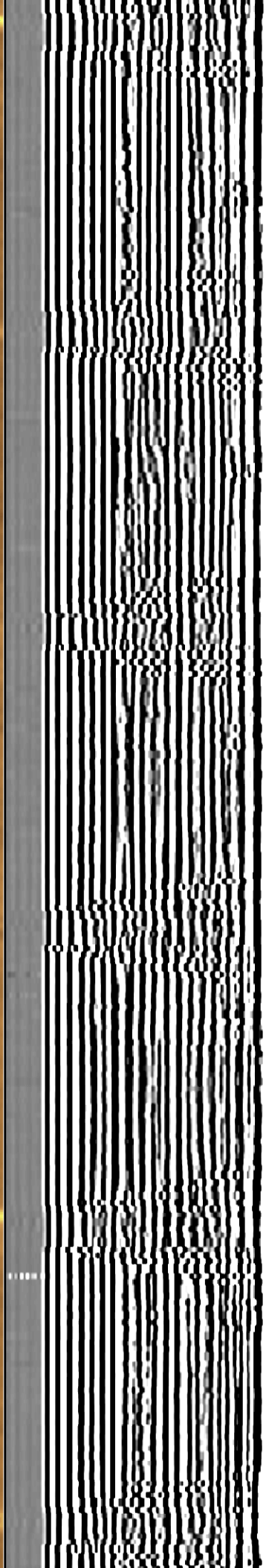
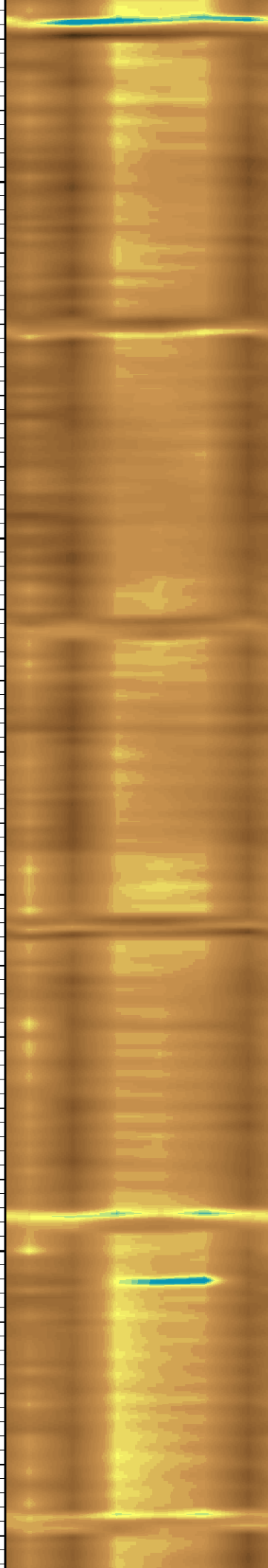
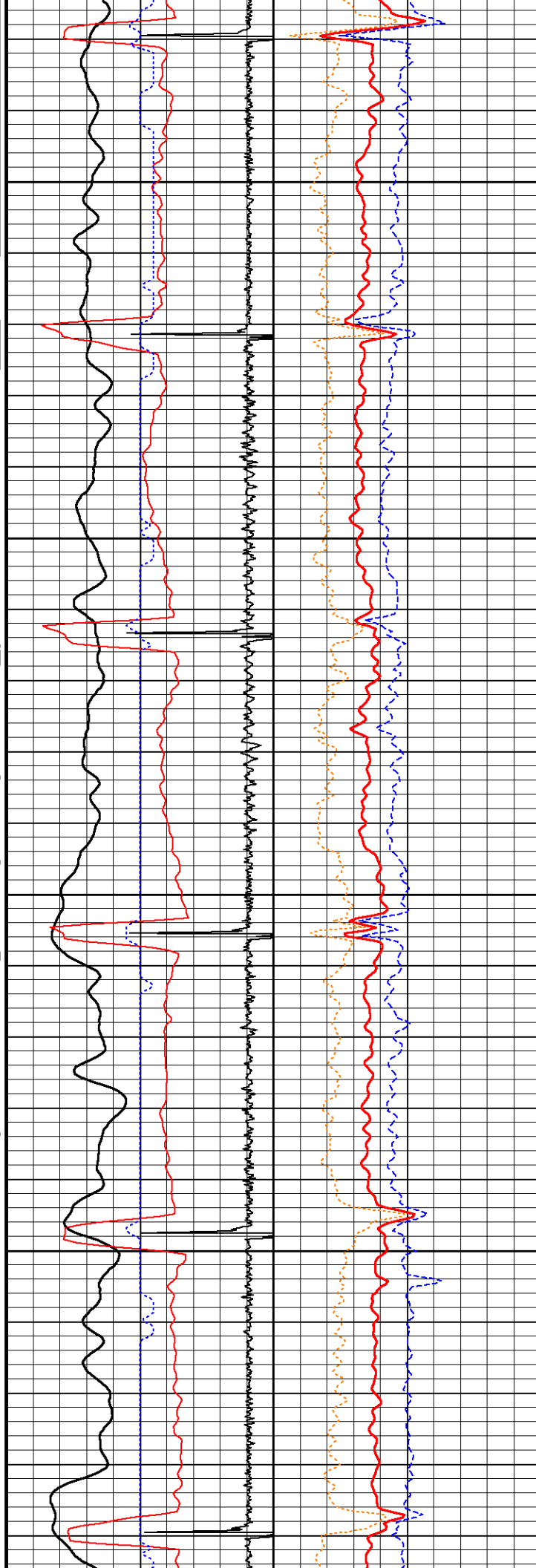
66°

650

67°

700

67°



750

68°

800

70°

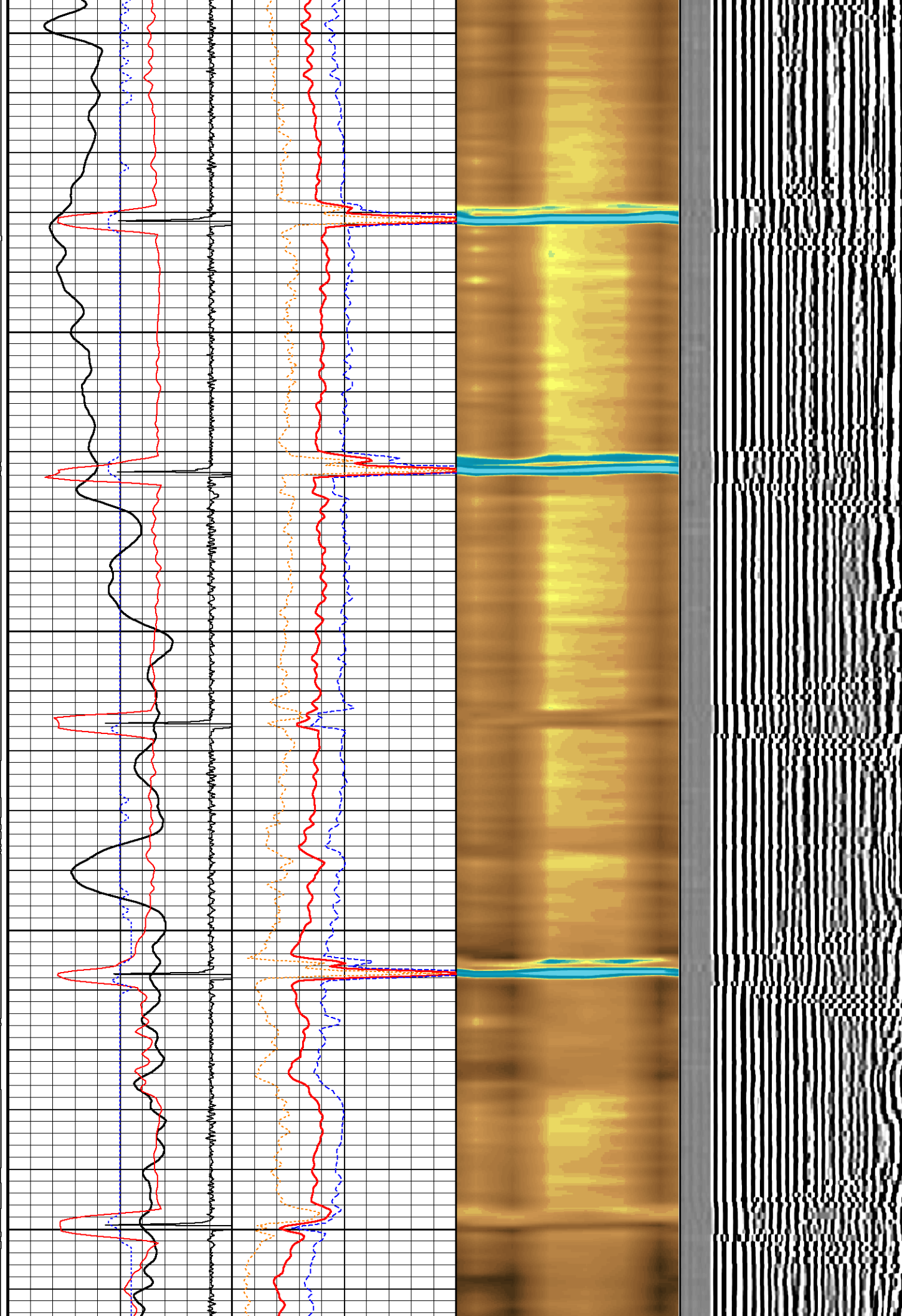
850

71°

900

72°

950



72°

1000

73°

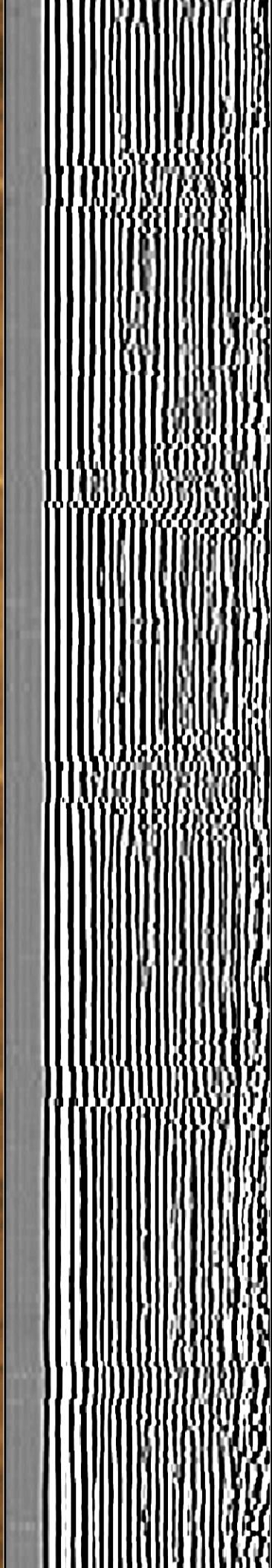
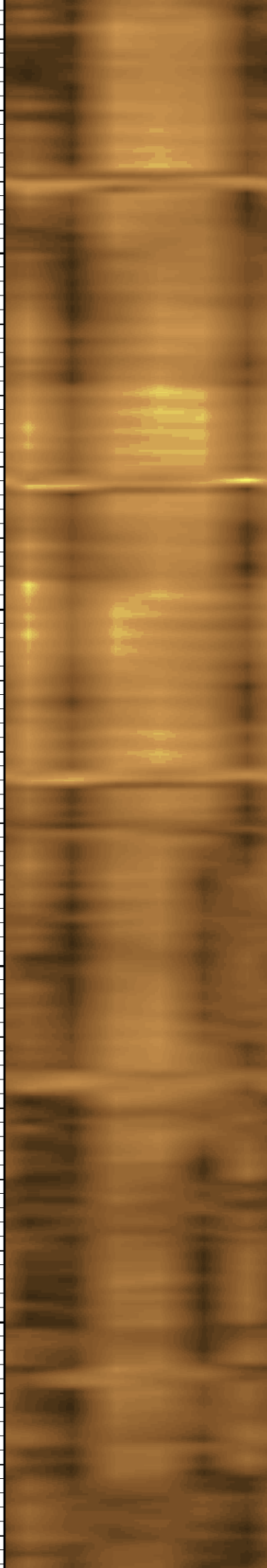
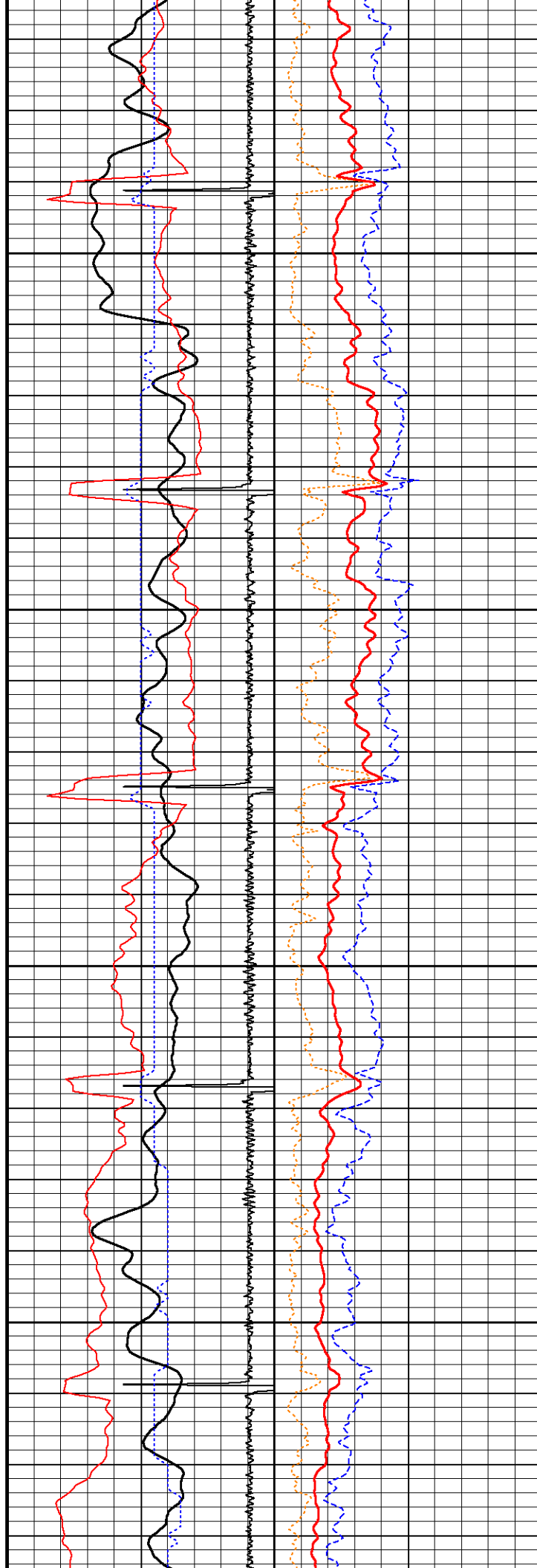
1050

74°

1100

75°

1150



76°

1200

77°

1250

77°

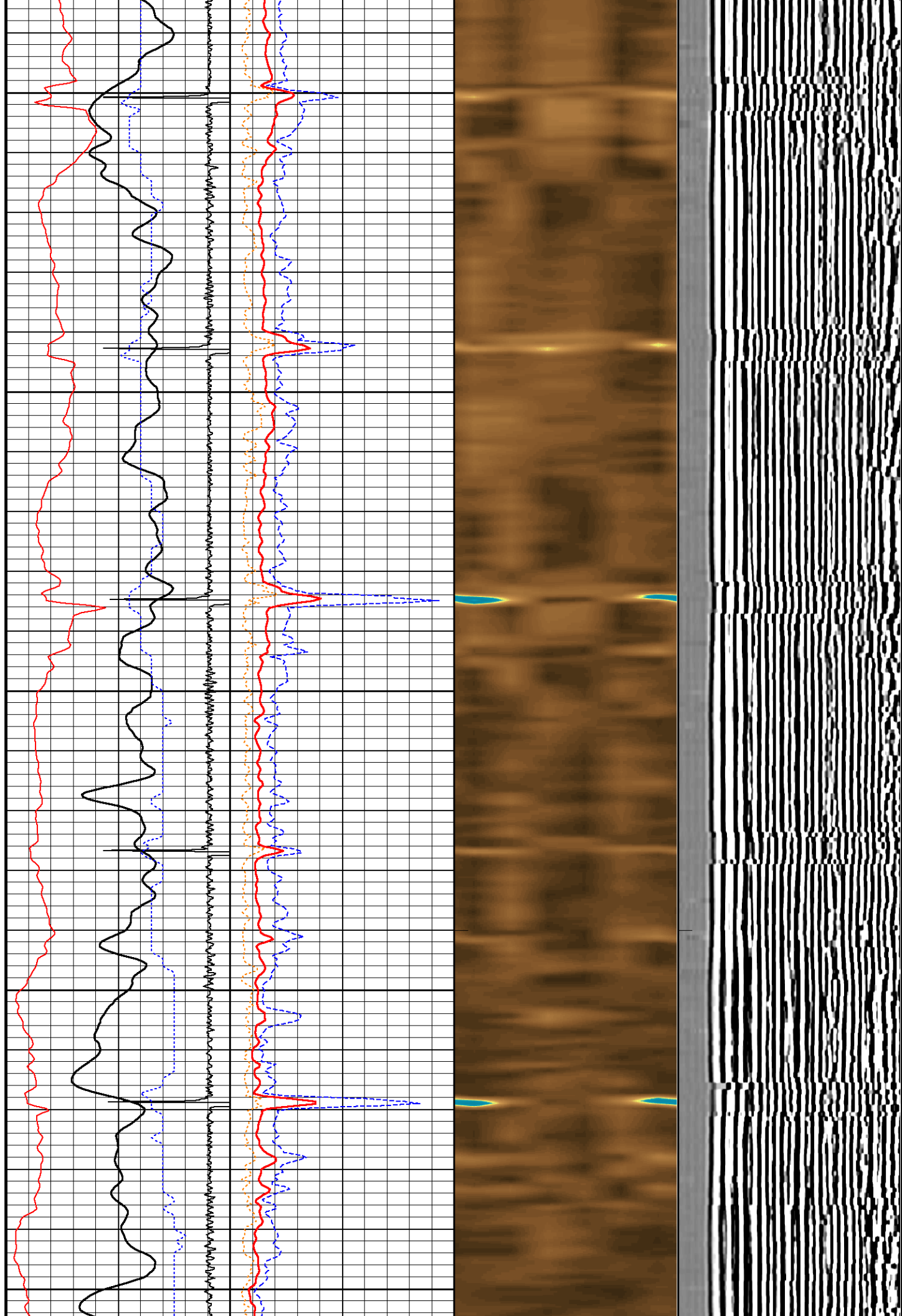
1300

78°

1350

79°

1400





80°

1450

81°

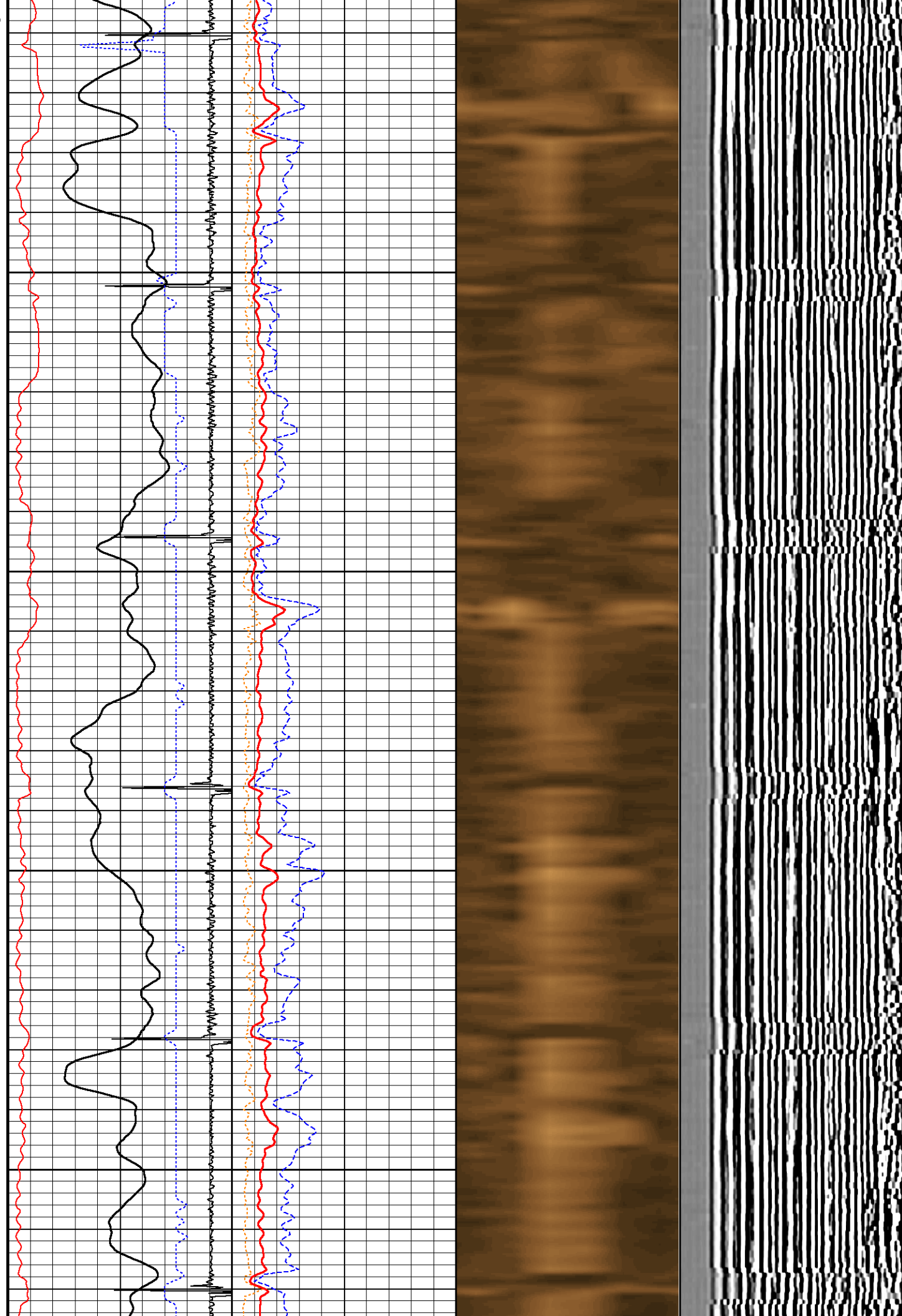
1500

81°

1550

82°

1600



83°

1650

83°

1700

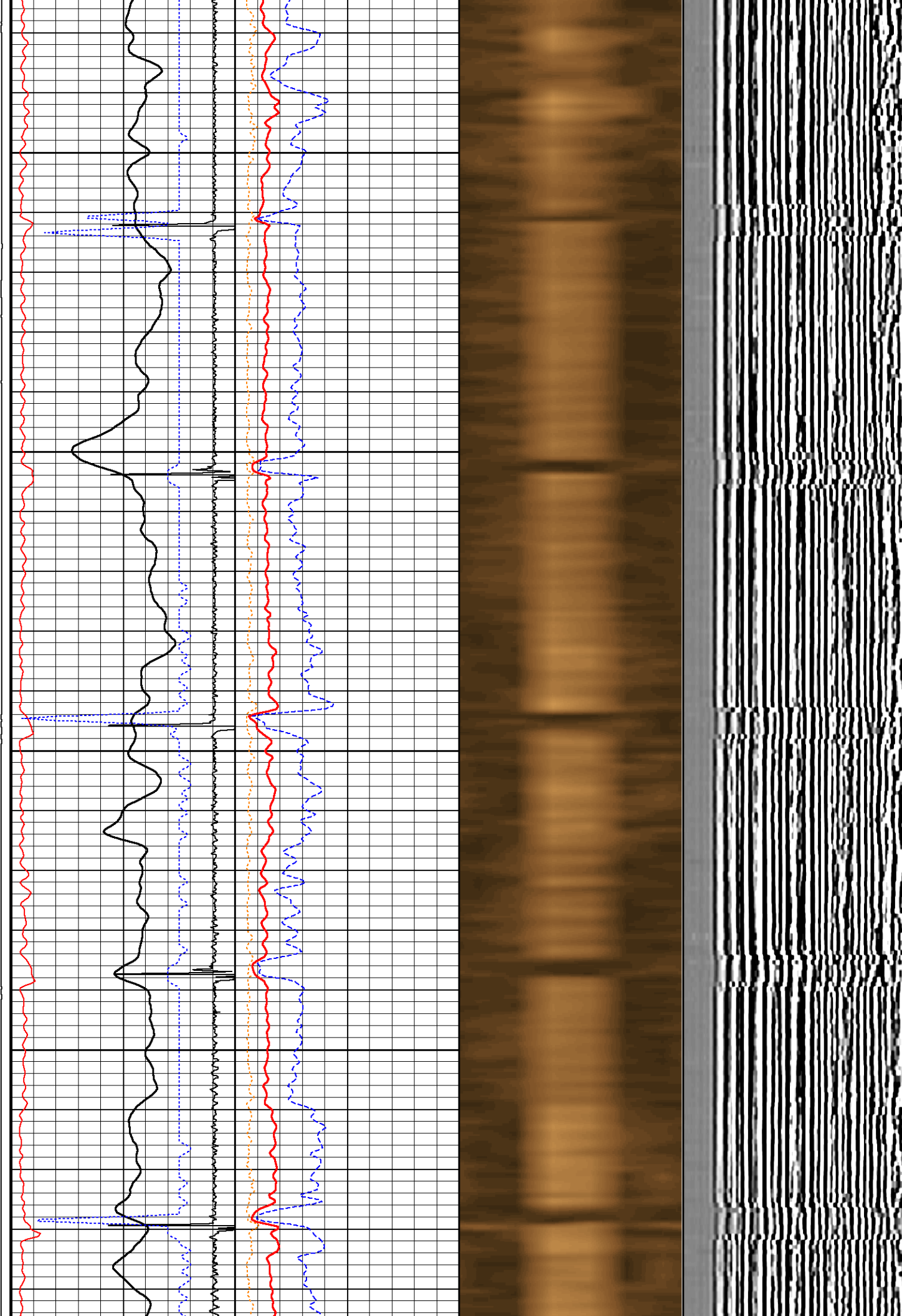
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1750

85°

1800

86°



1850

87°

1900

88°

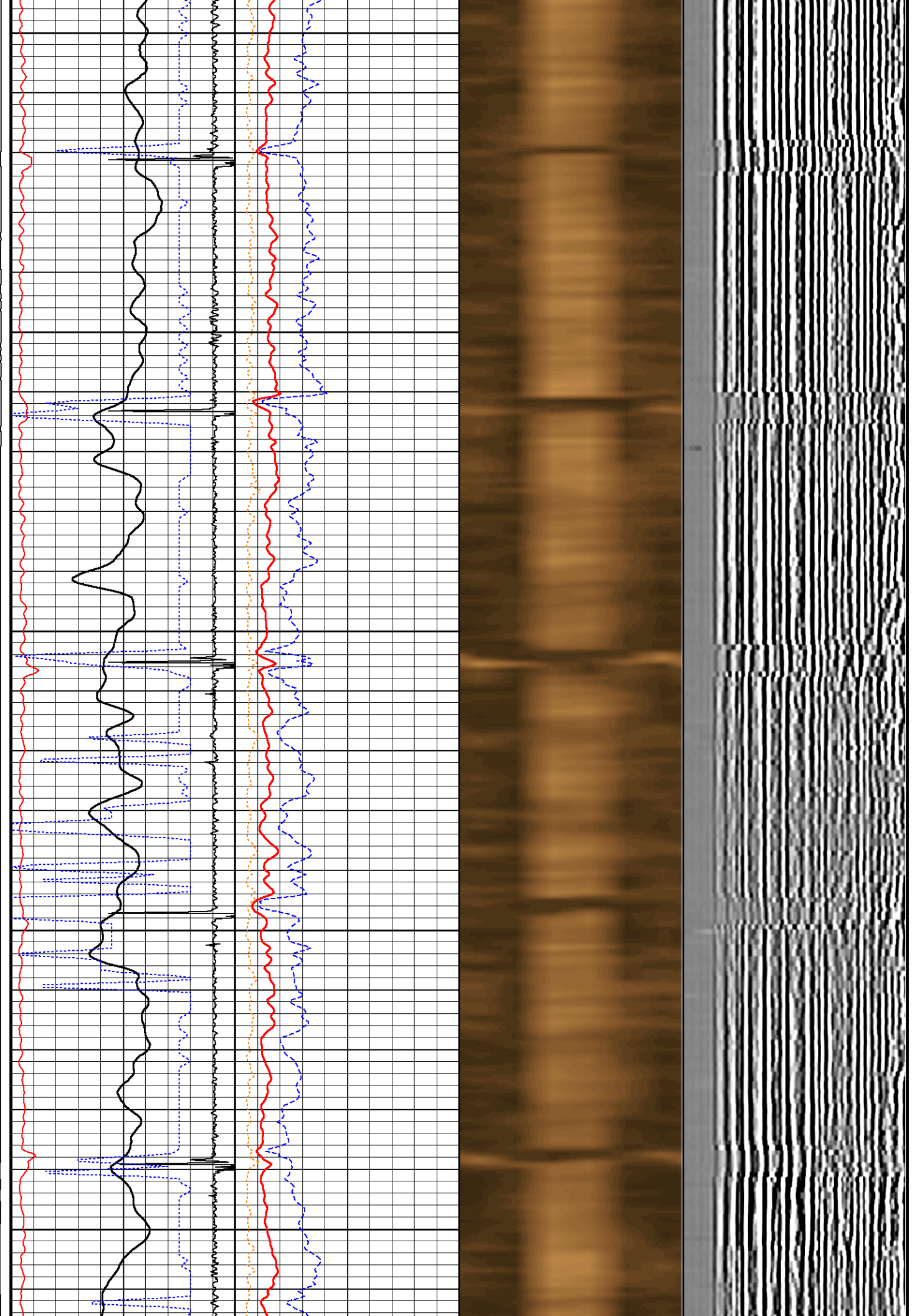
1950

88°

2000

89°

2050



90°

2100

91°

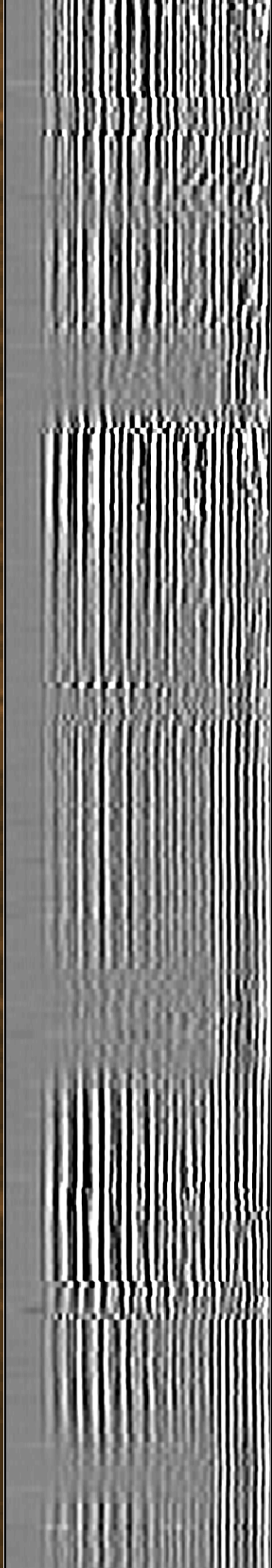
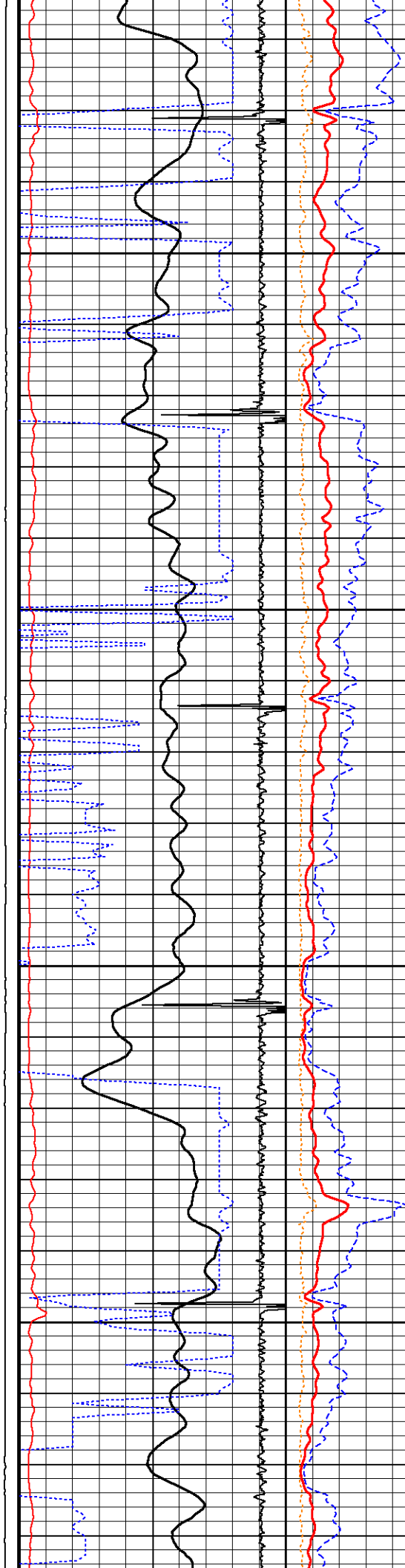
2150

92°

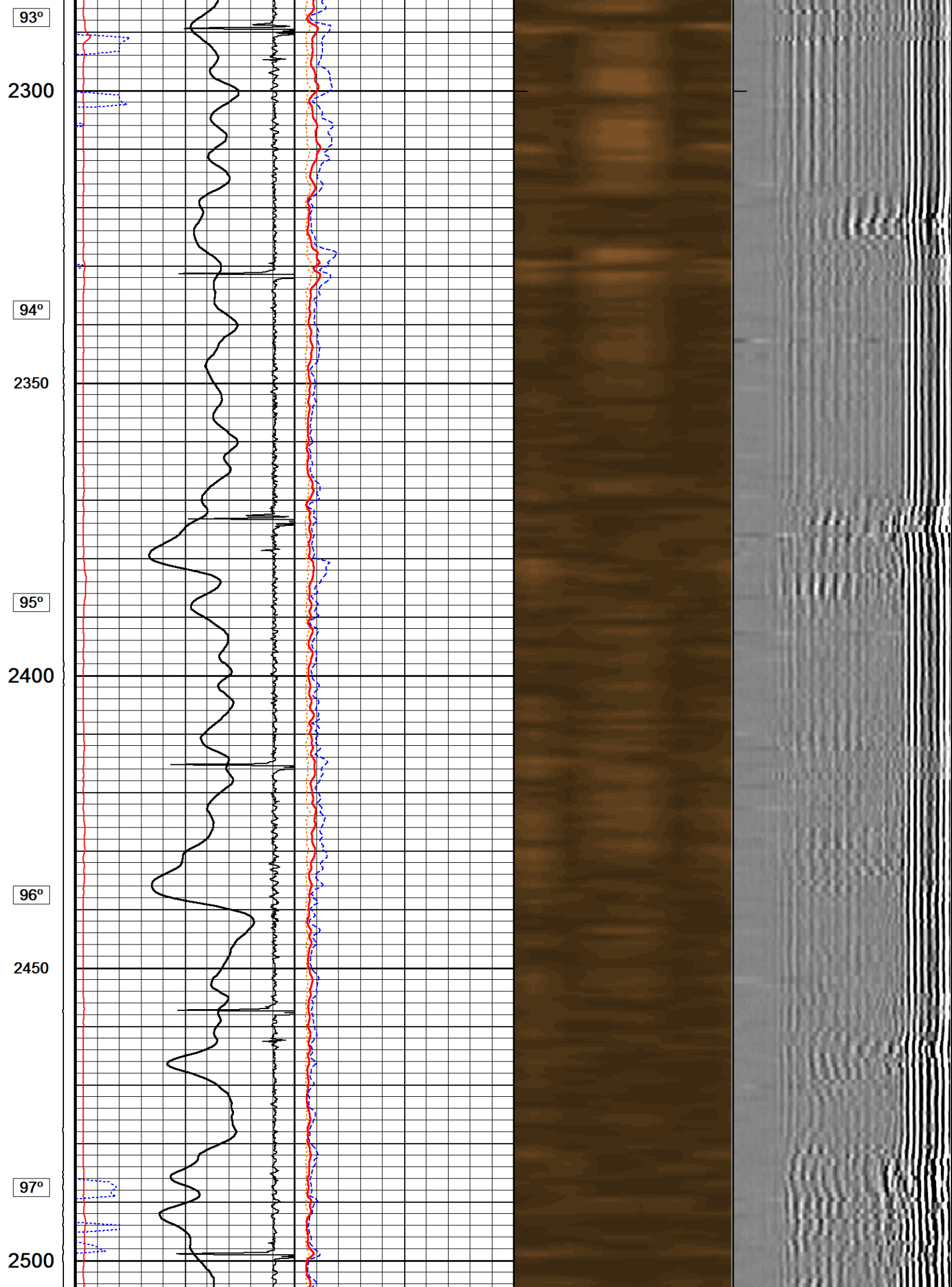
2200

93°

2250







97°

2550

98°

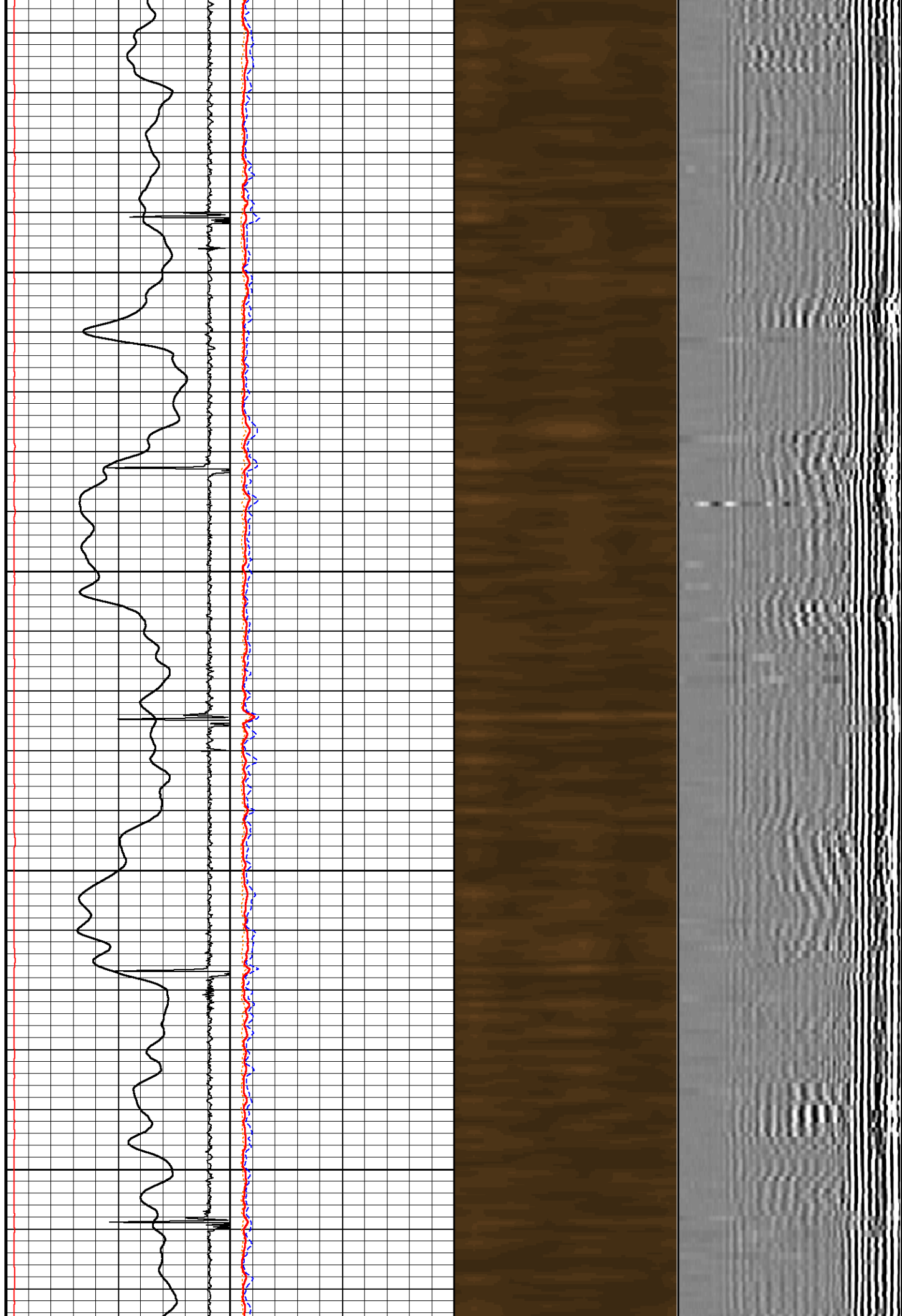
2600

99°

2650

100°

2700



100°

2750

101°

2800

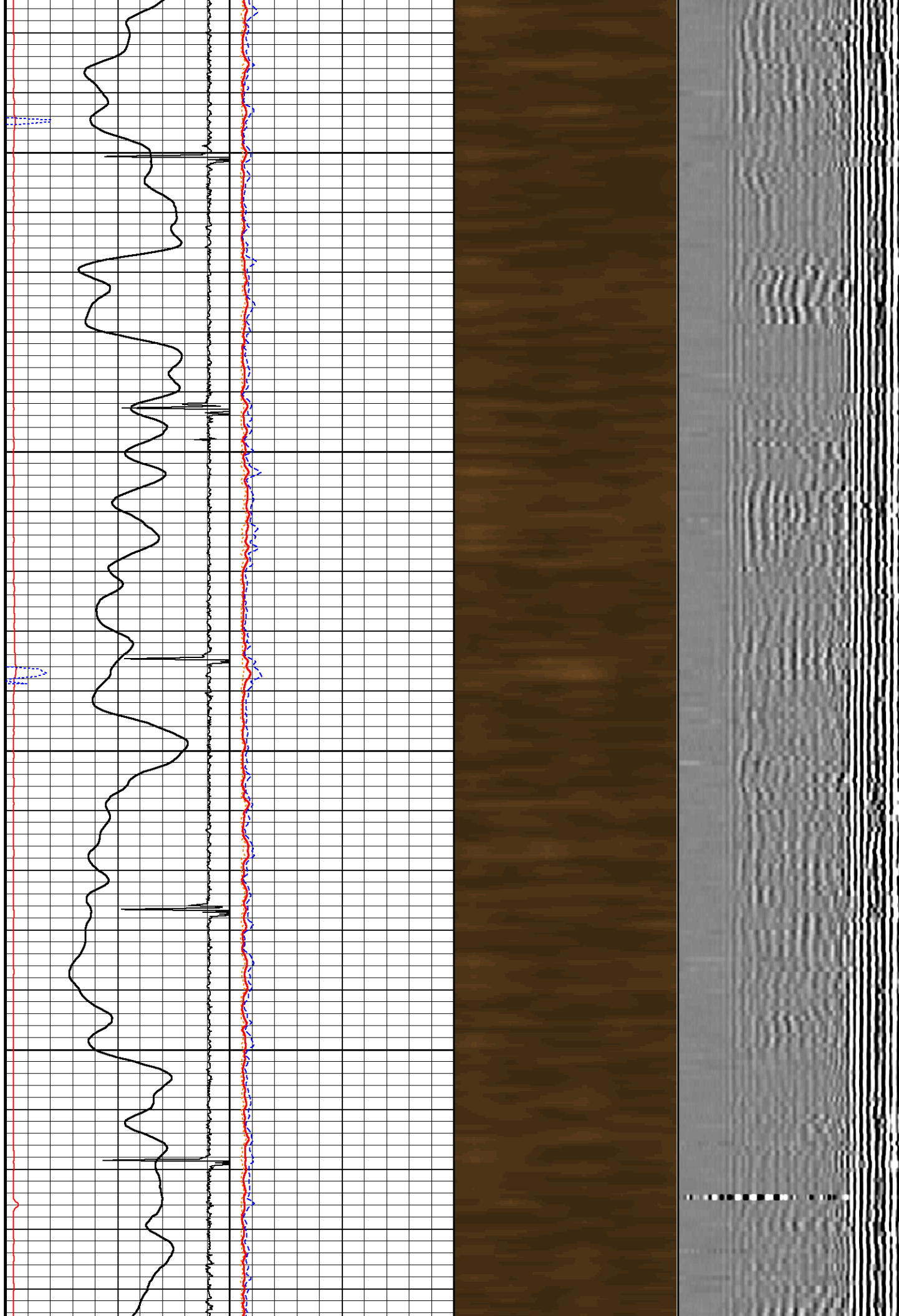
102°

2850

102°

2900

103°



2950

104°

3000

105°

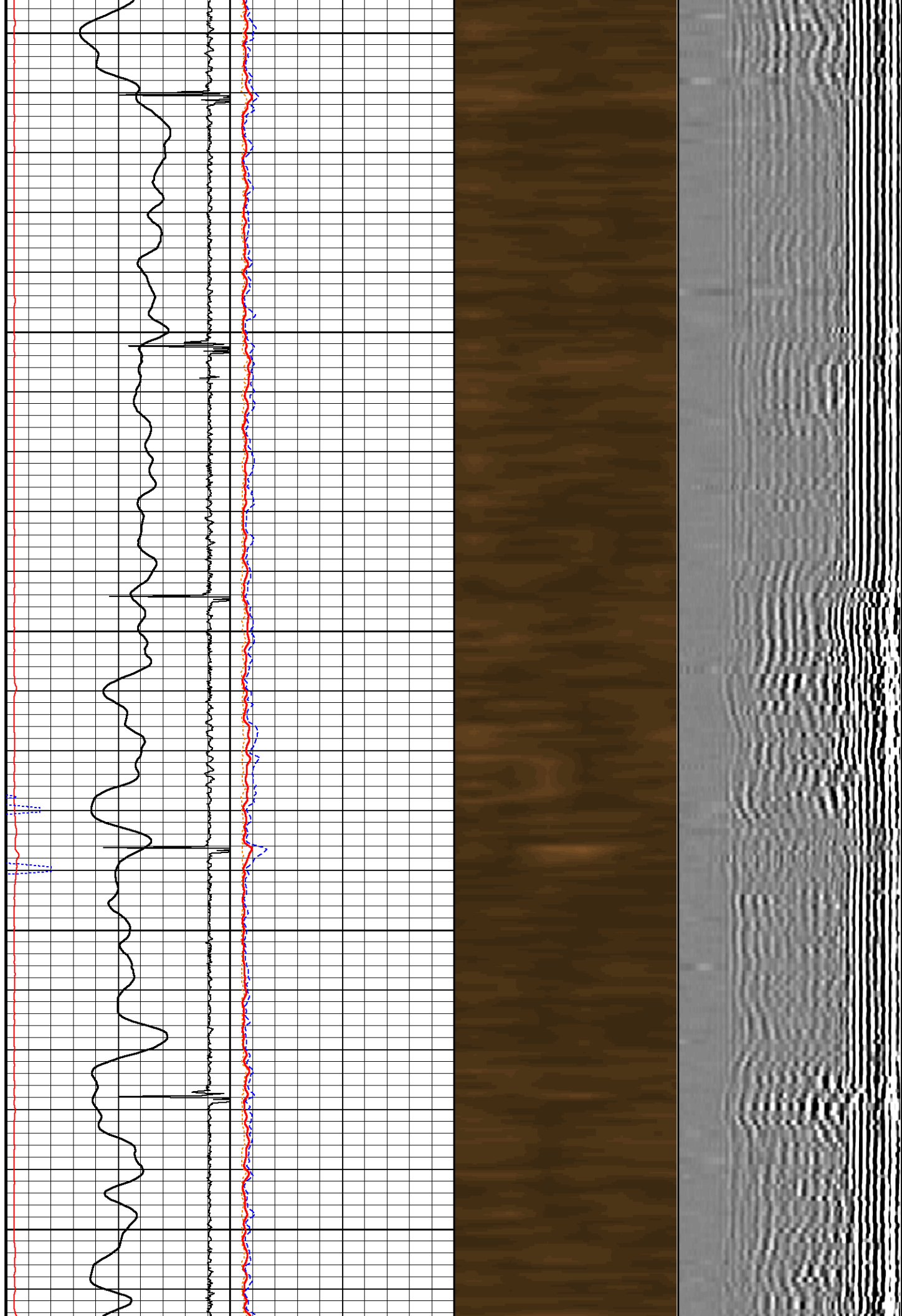
3050

106°

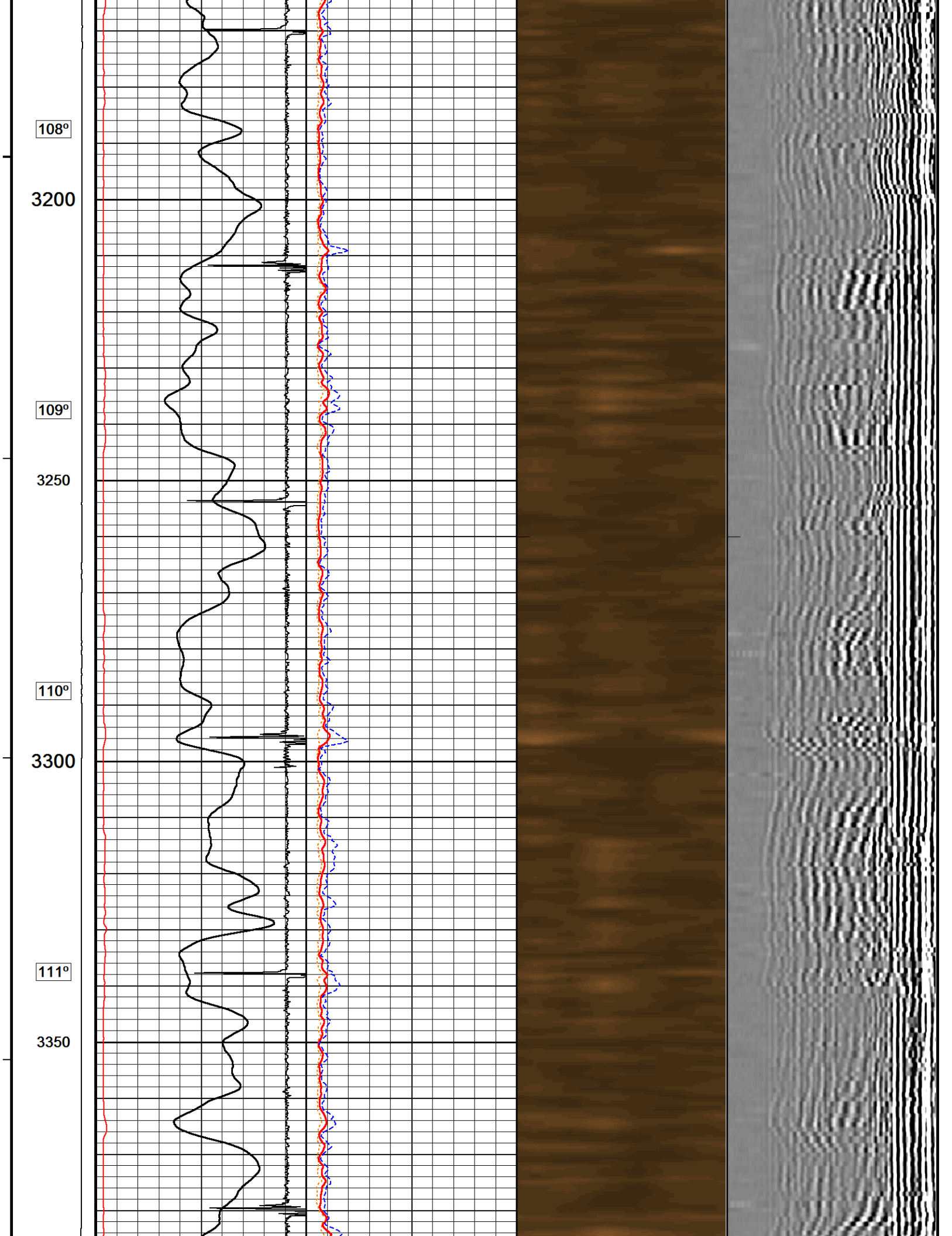
3100

107°

3150







112°

3400

114°

3450

114°

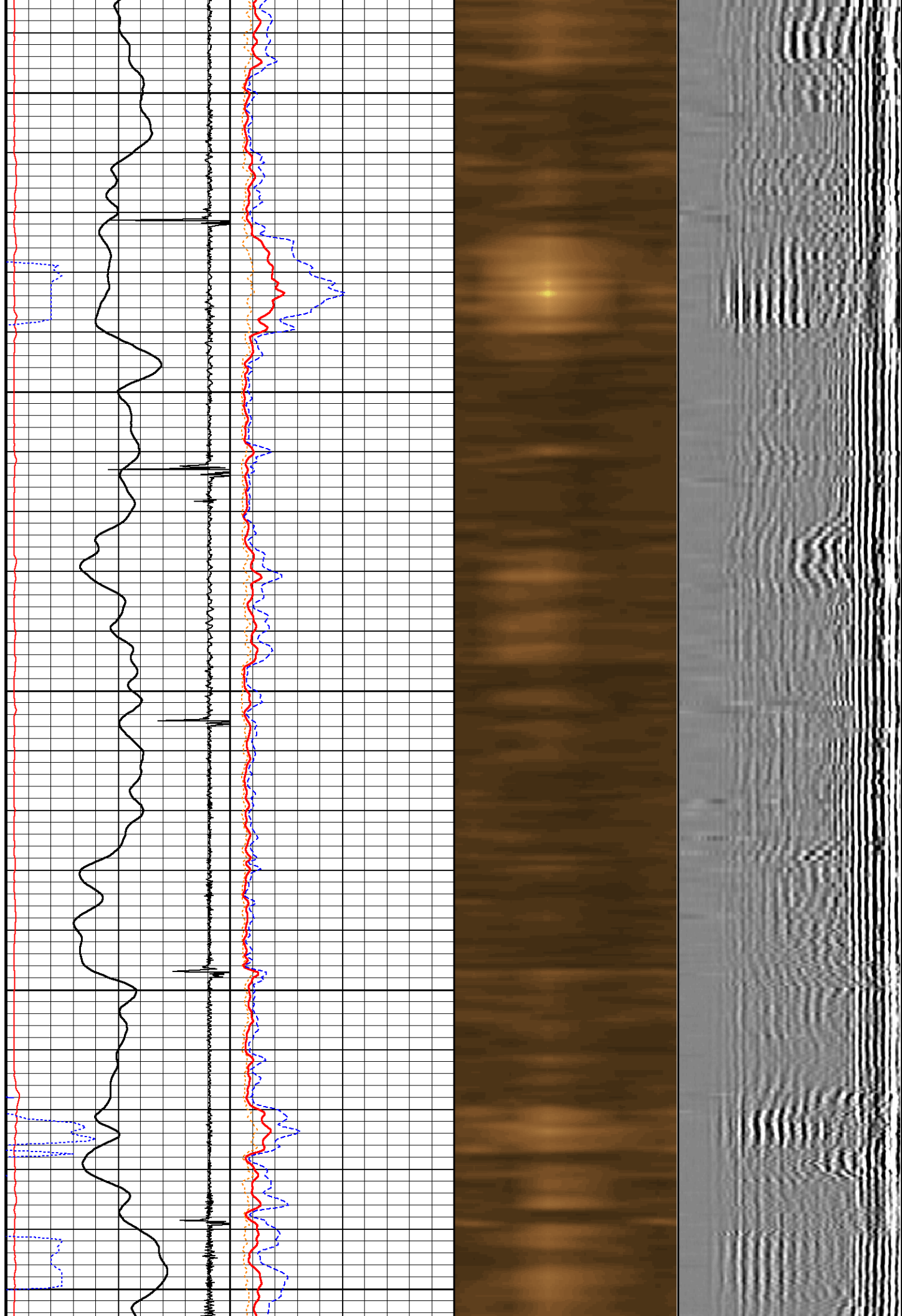
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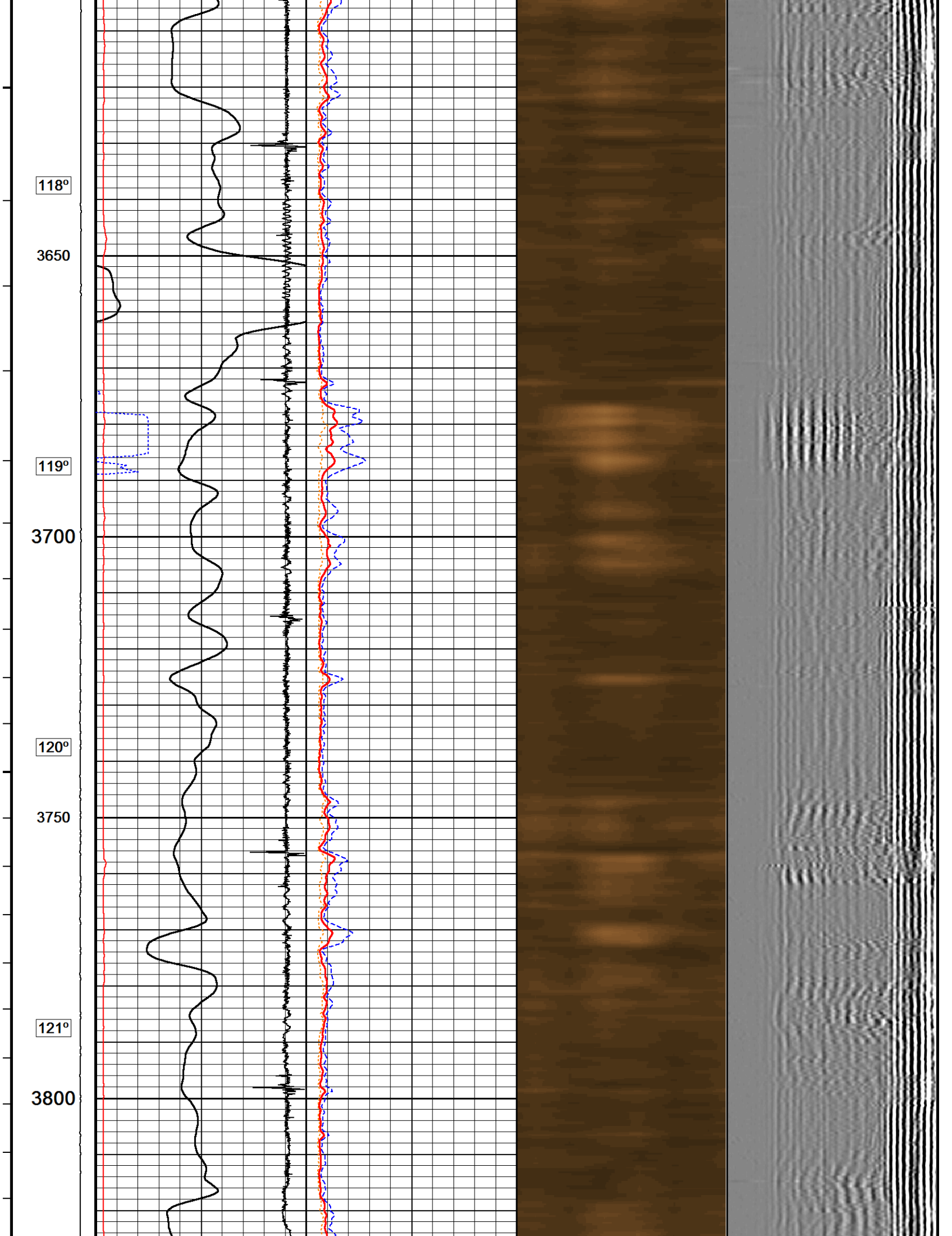
116°

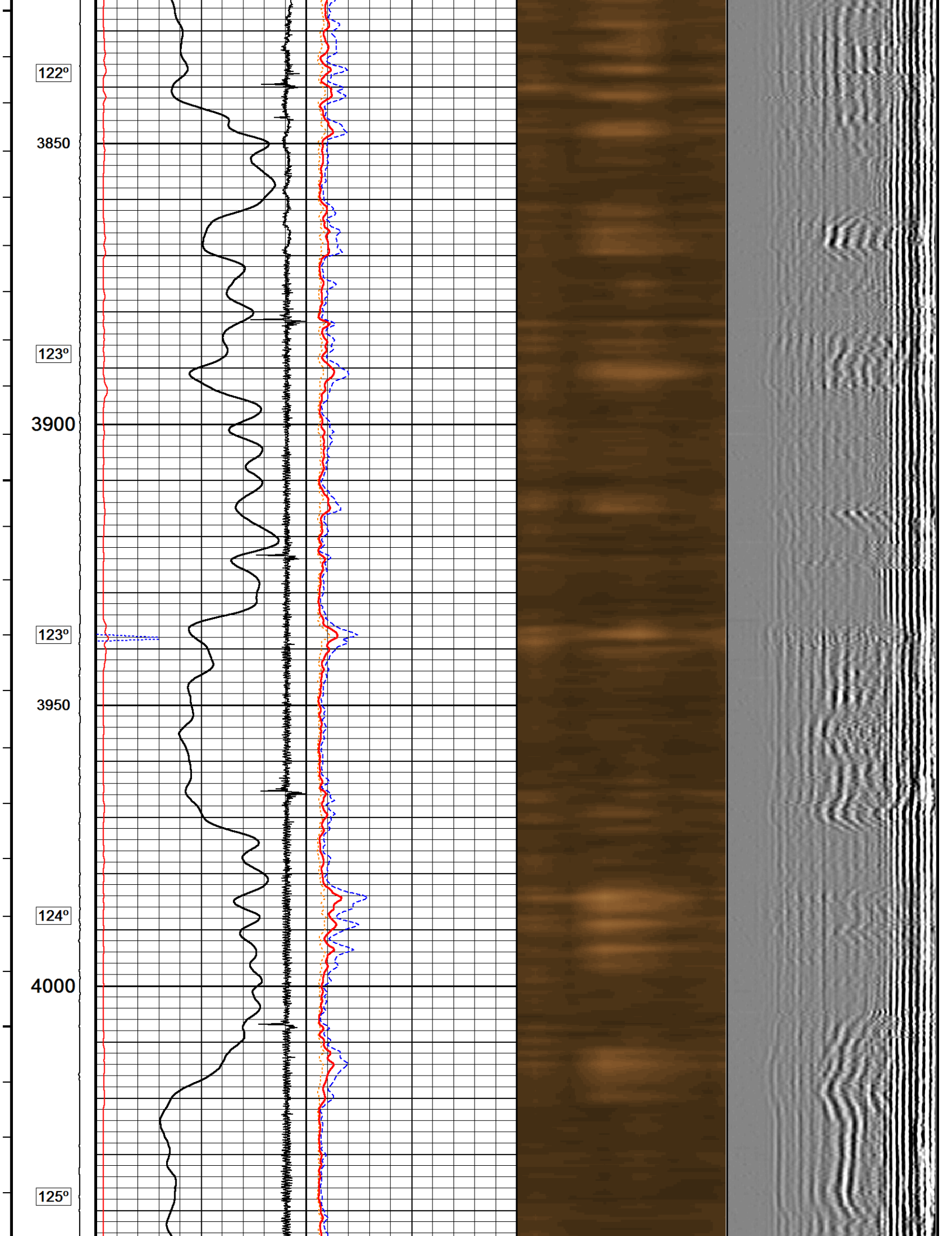
3550

117°

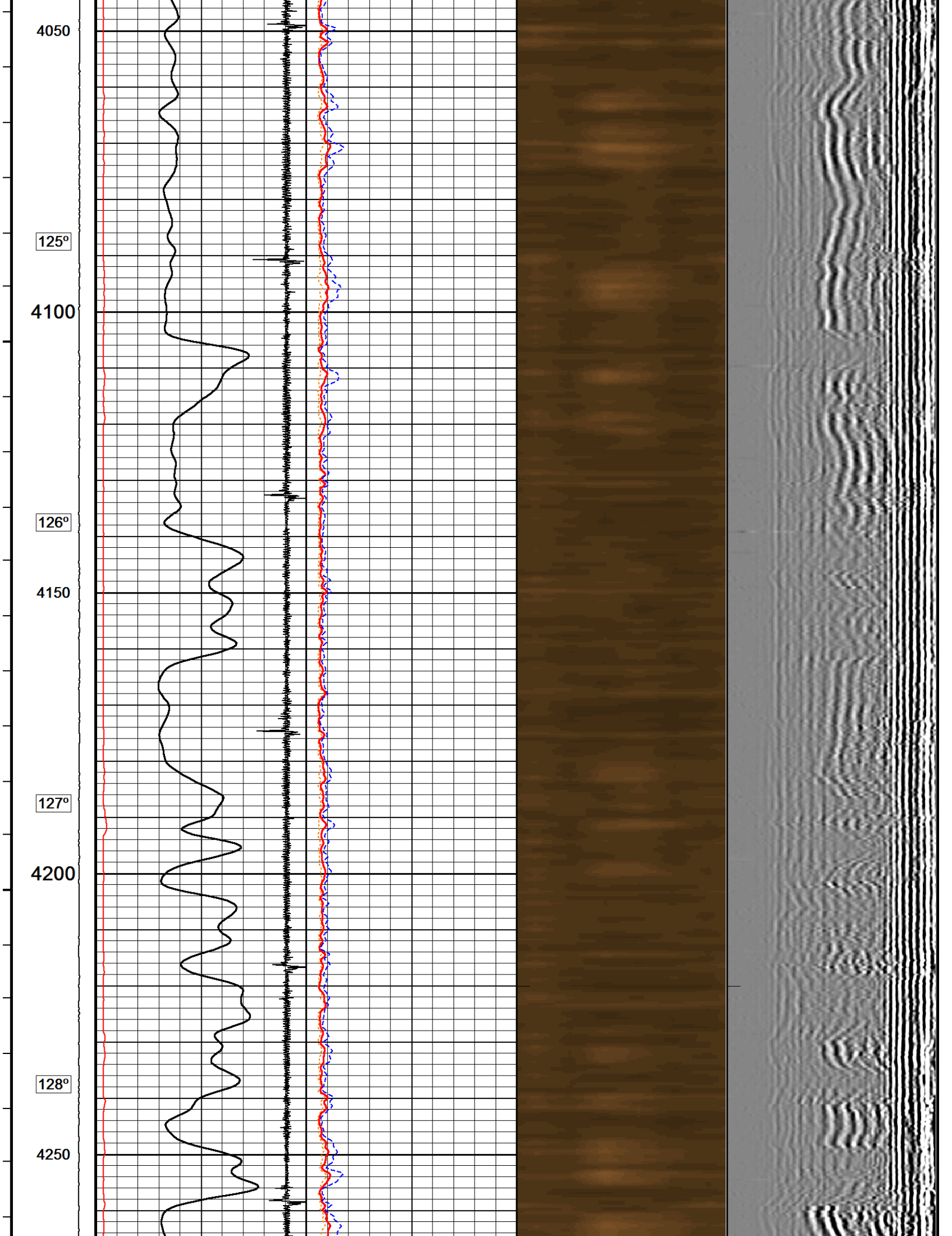
3600

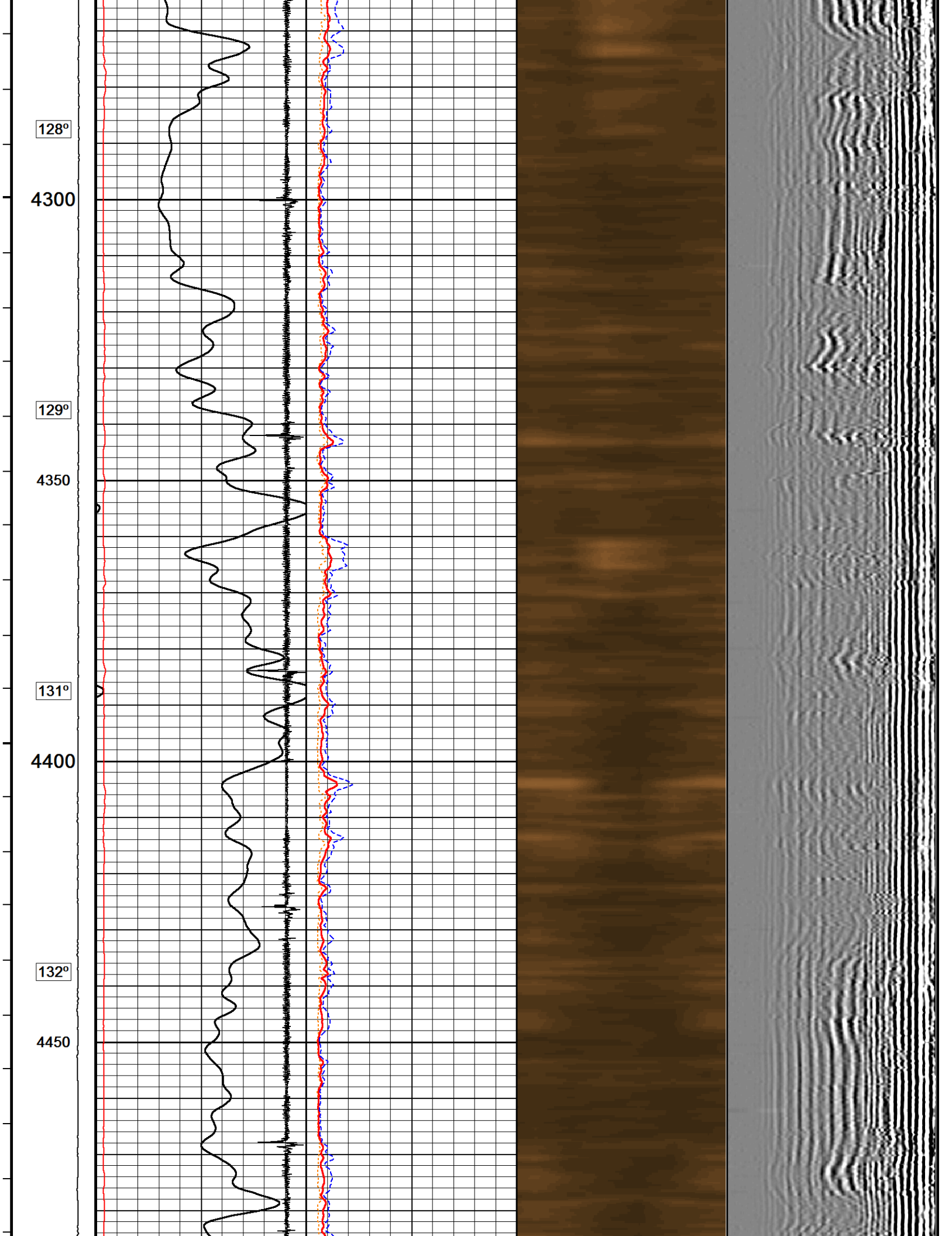


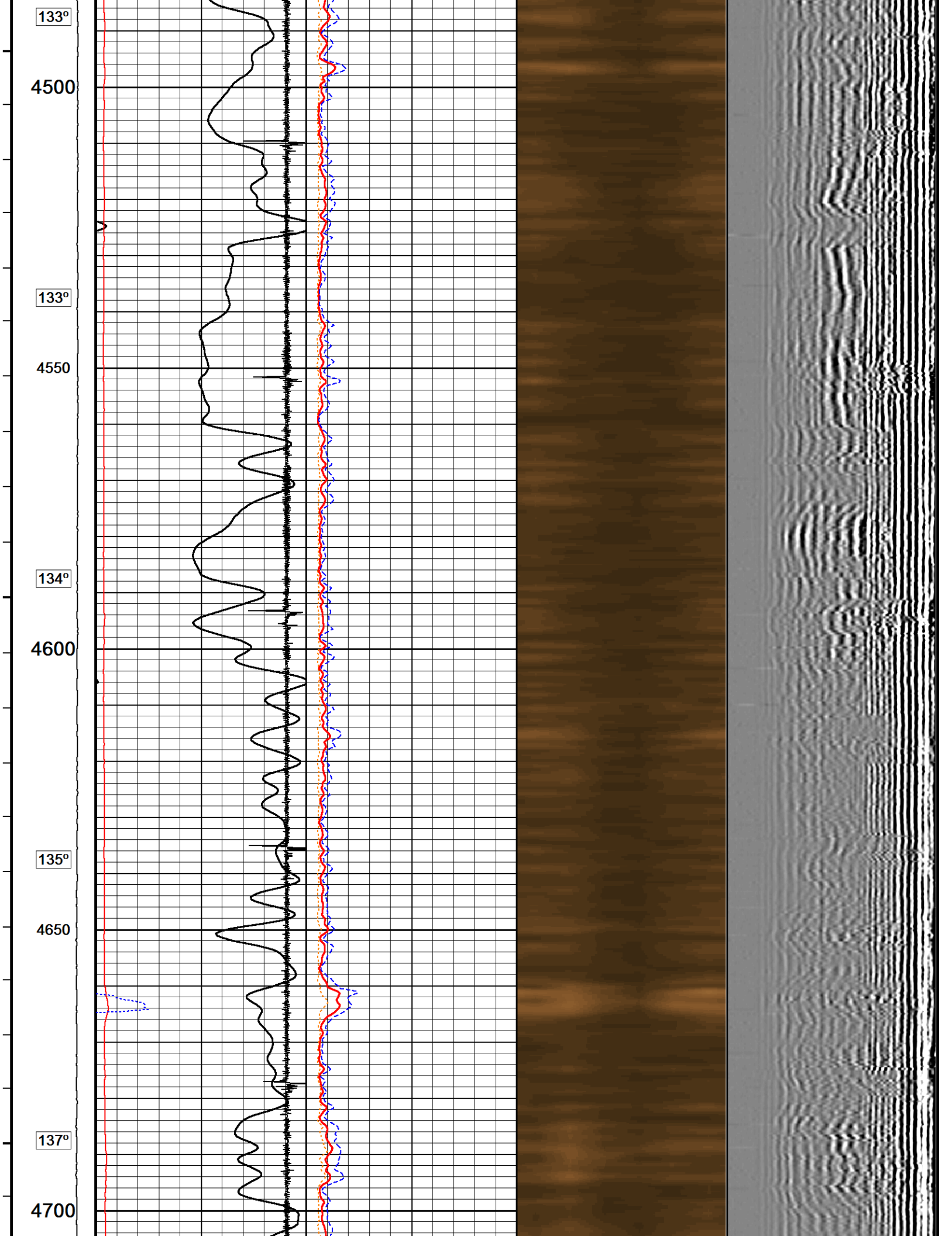




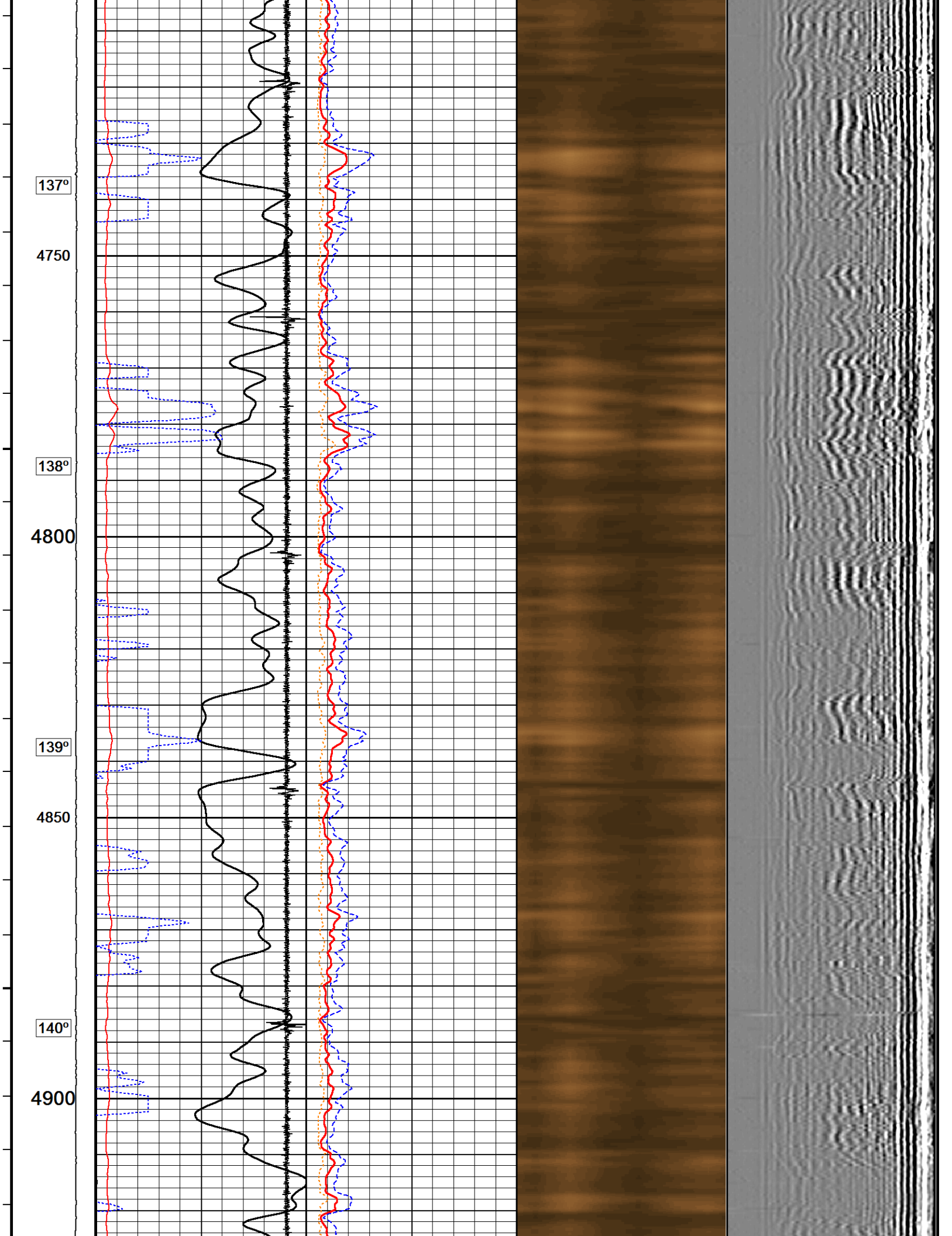


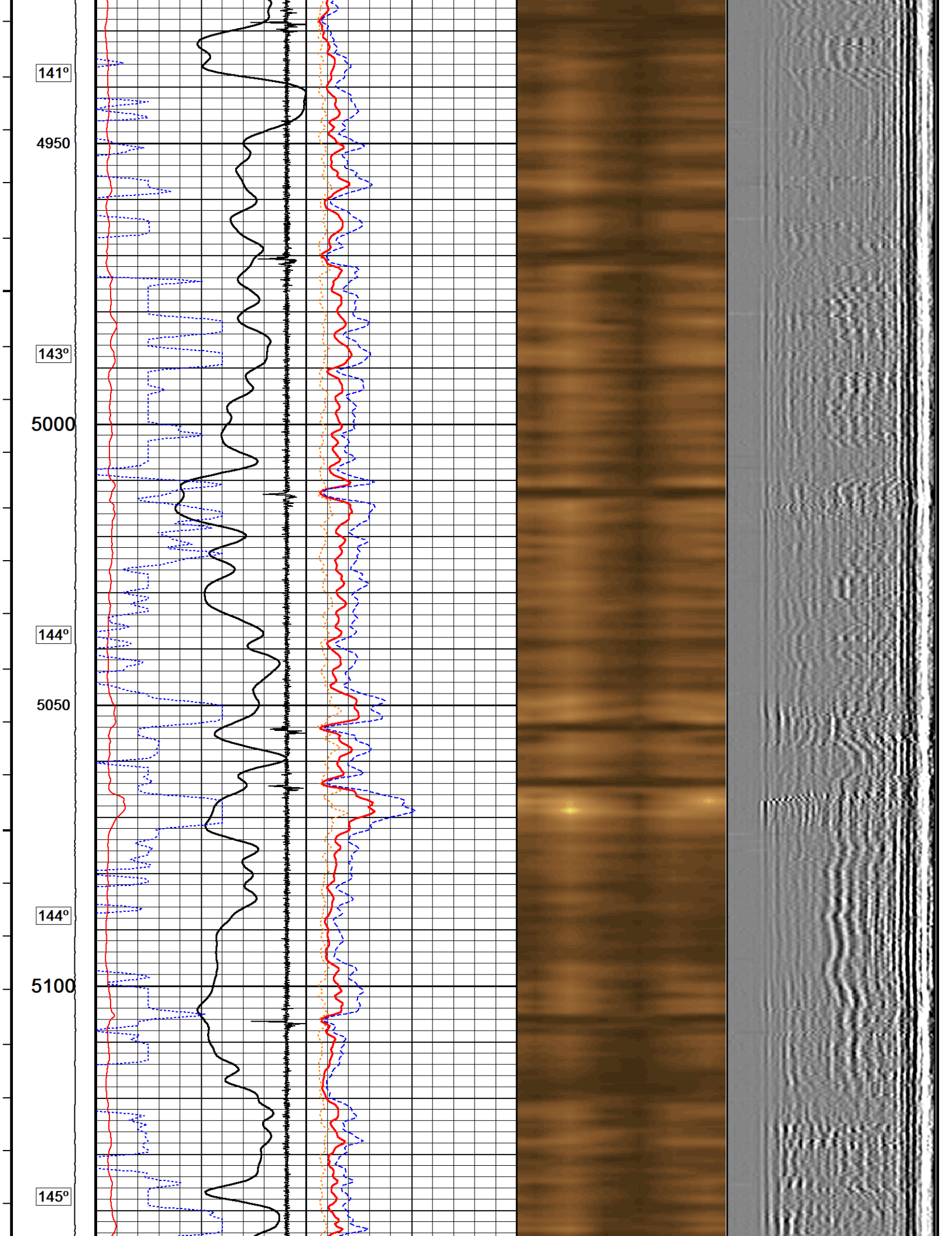




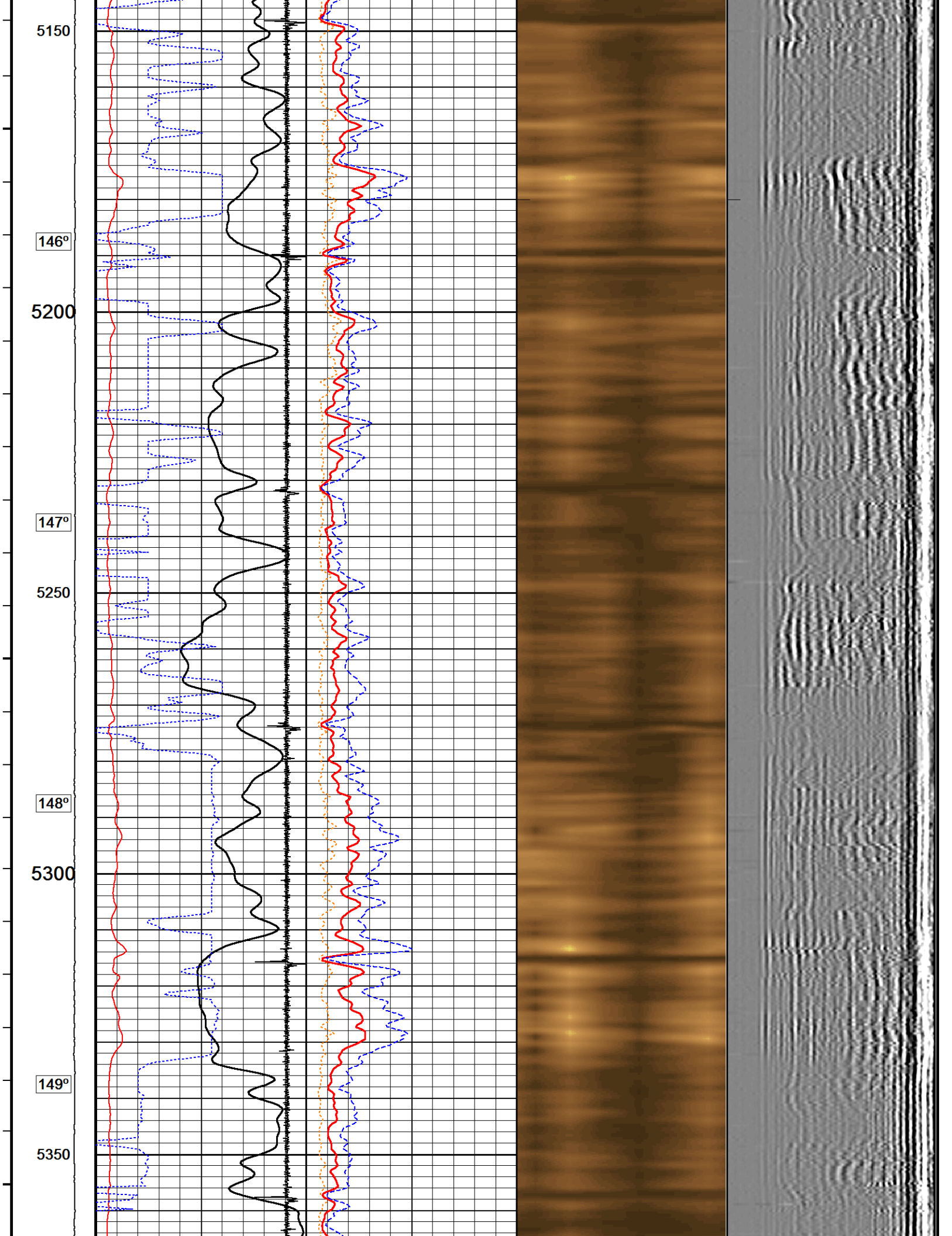


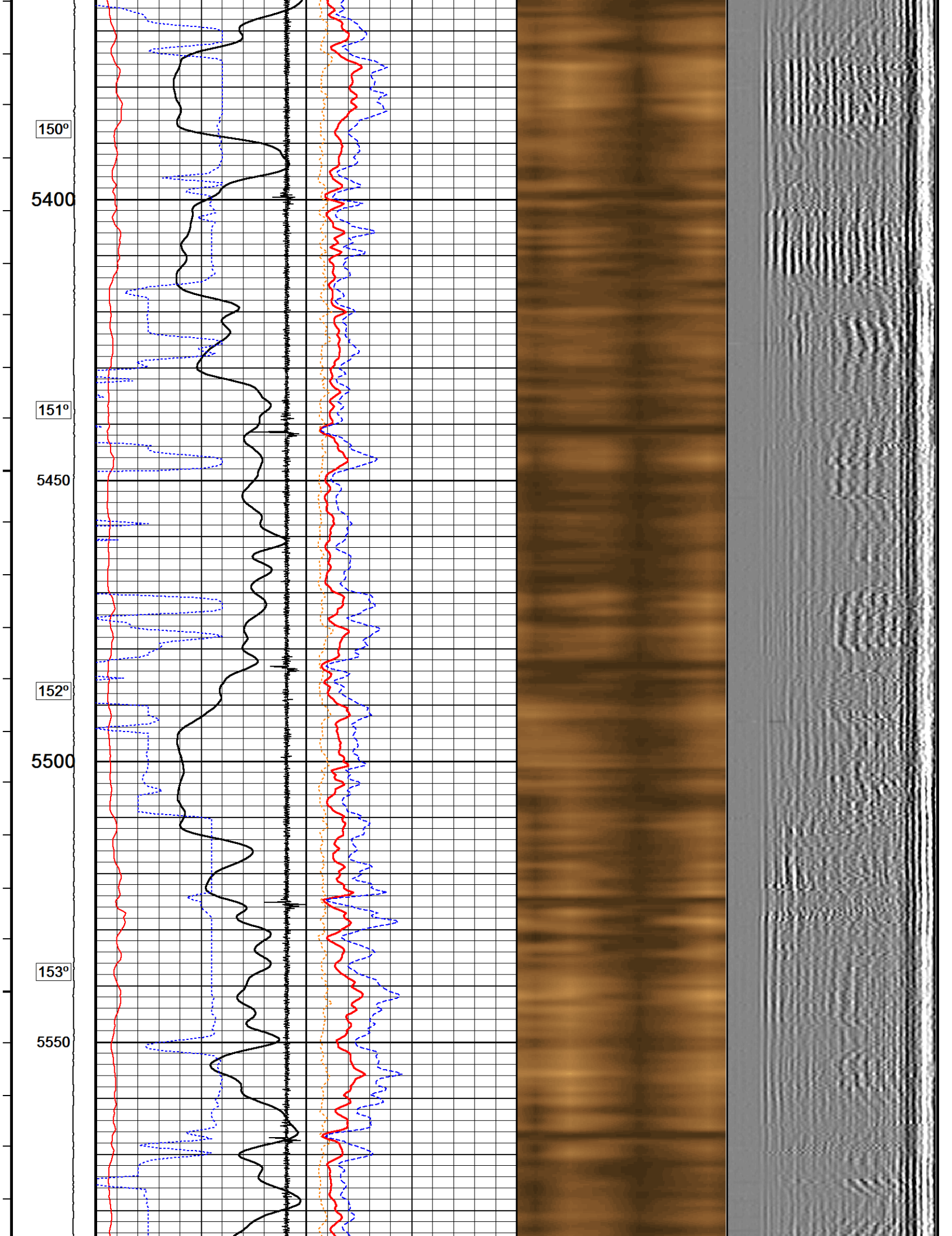




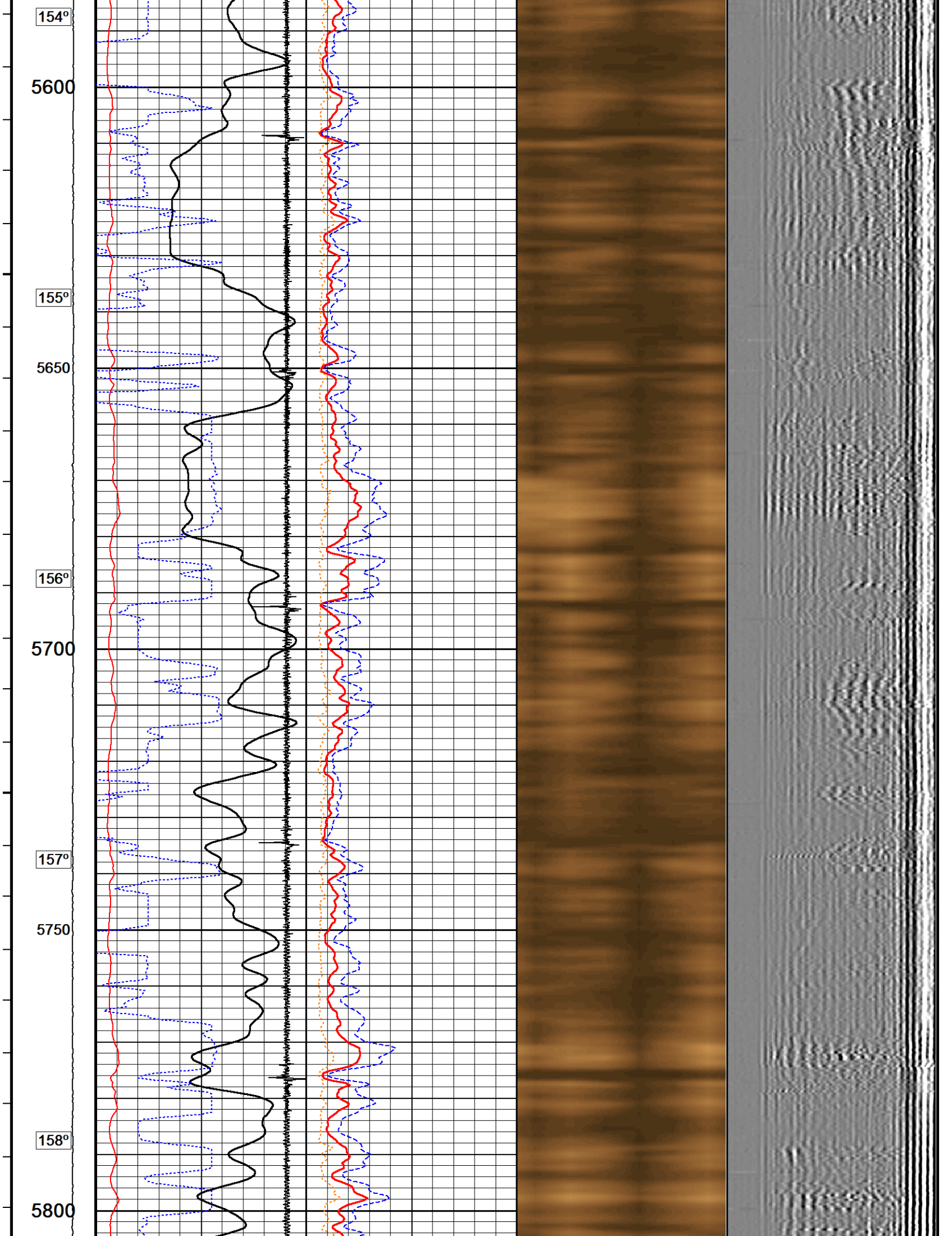


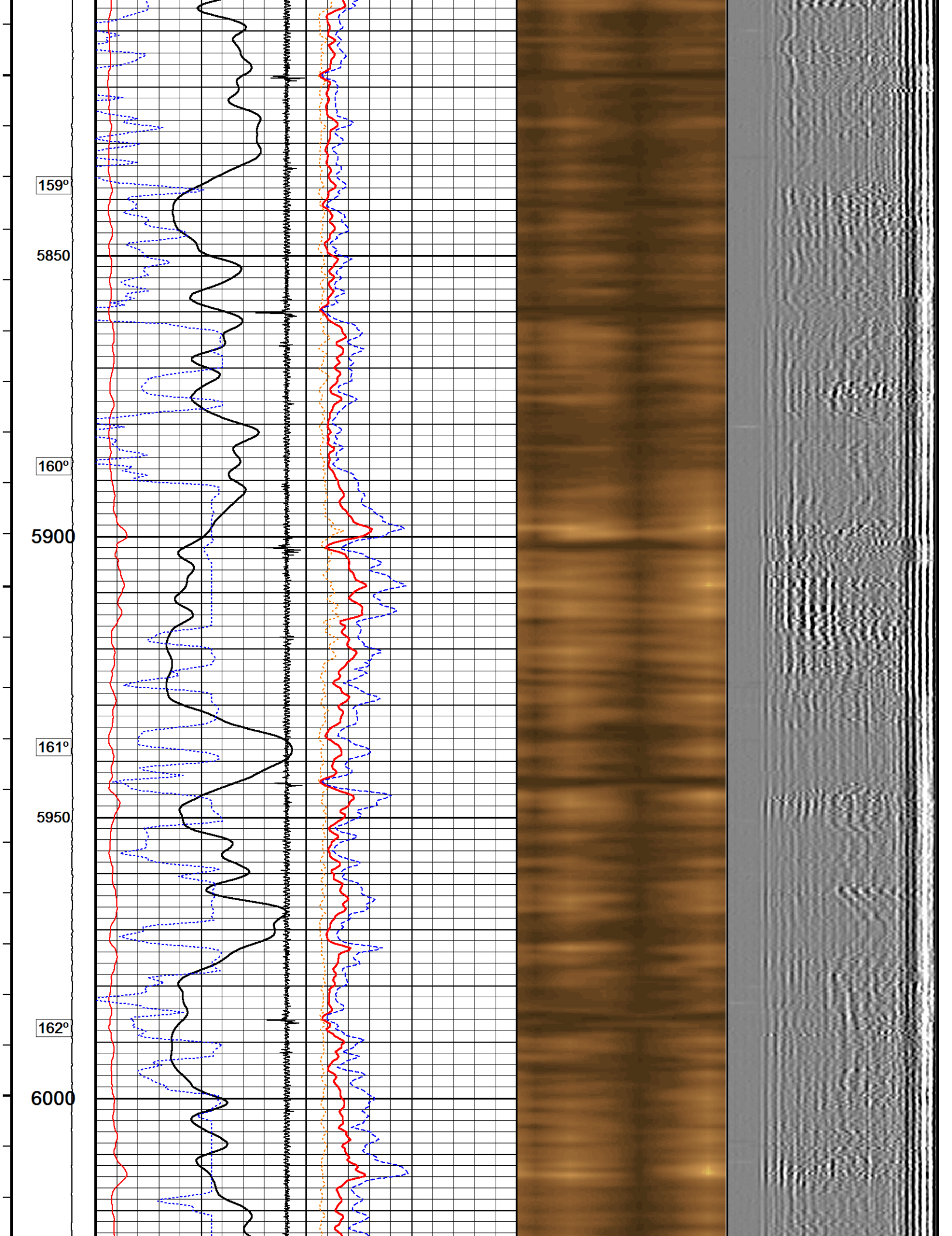




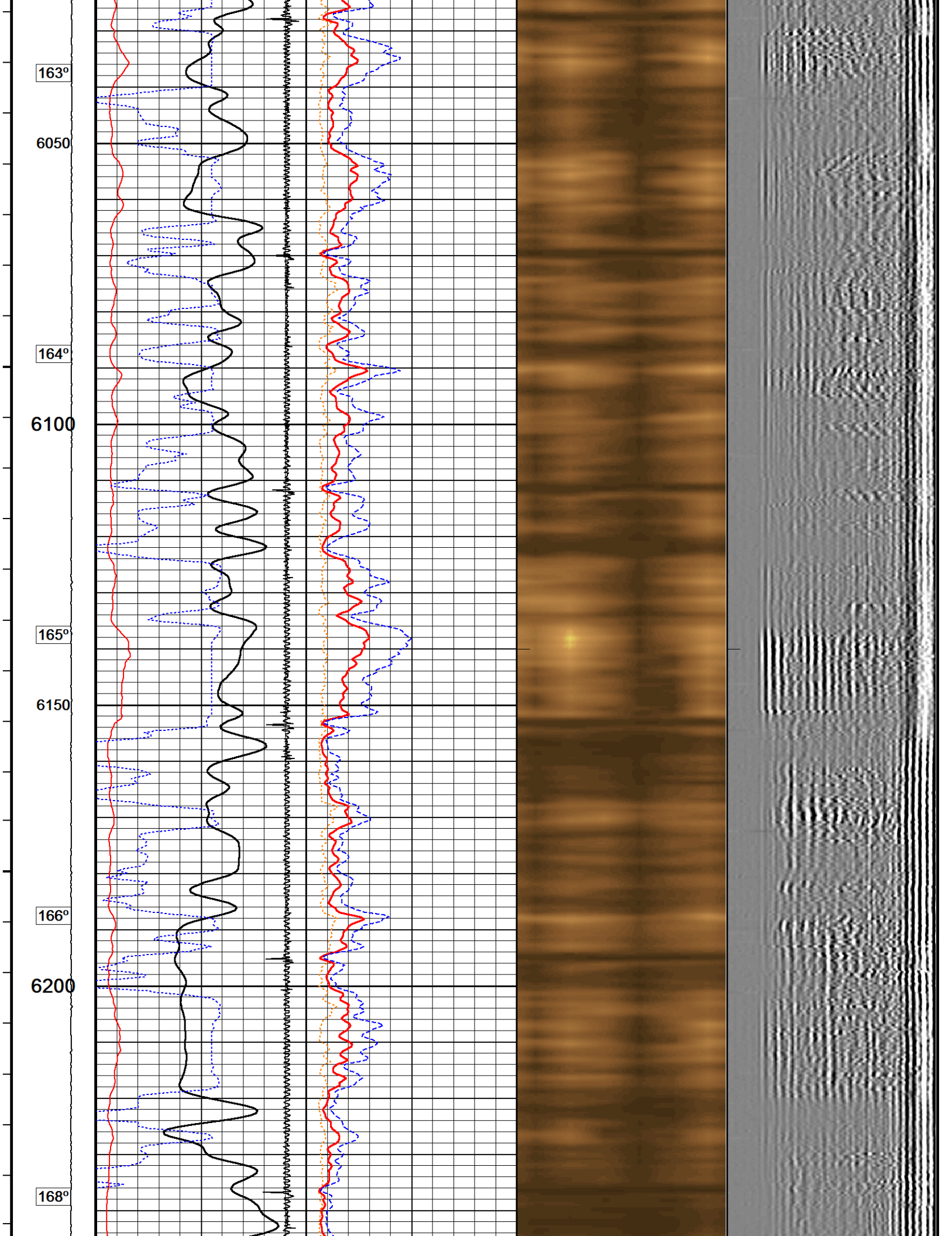


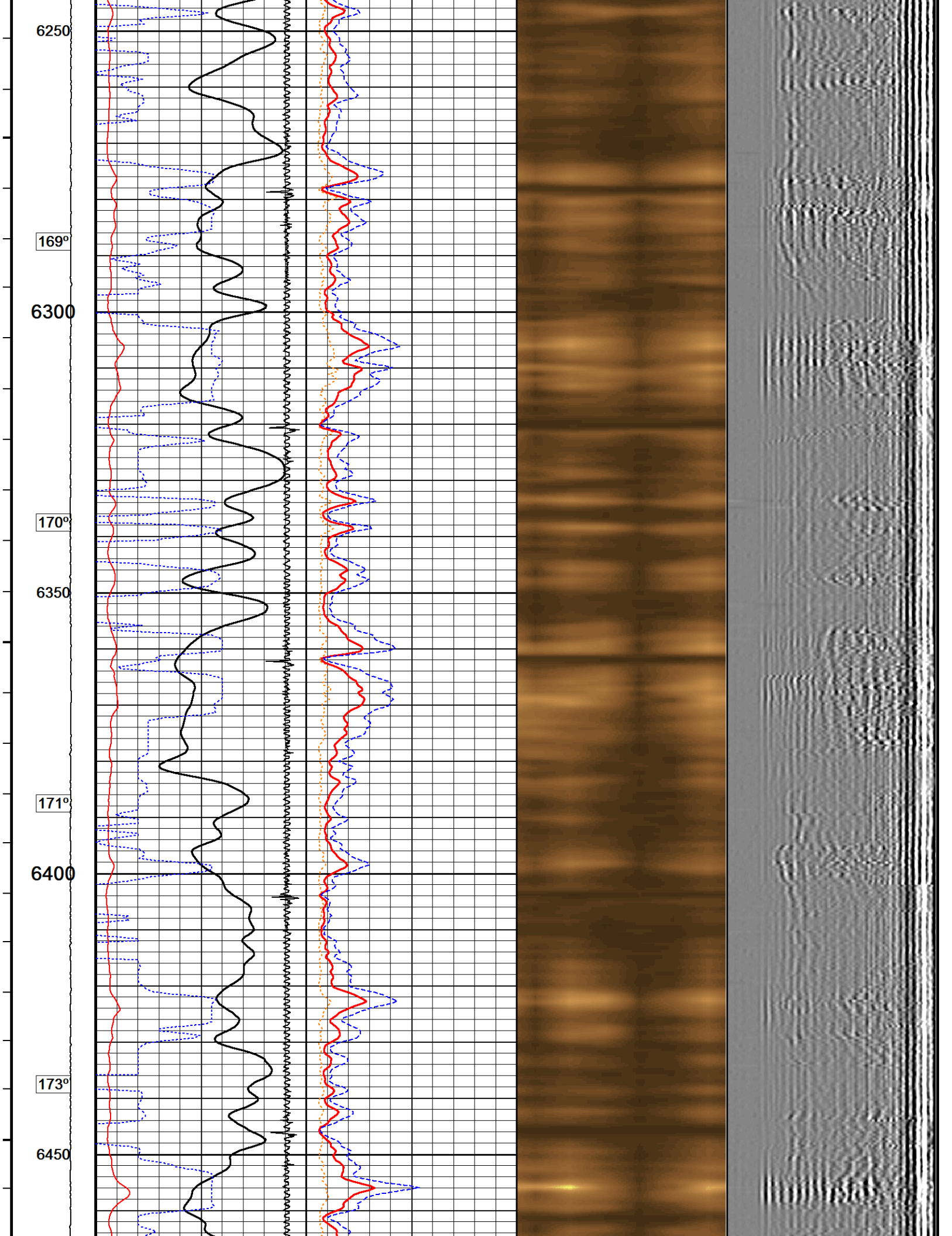














174°

6500

176°

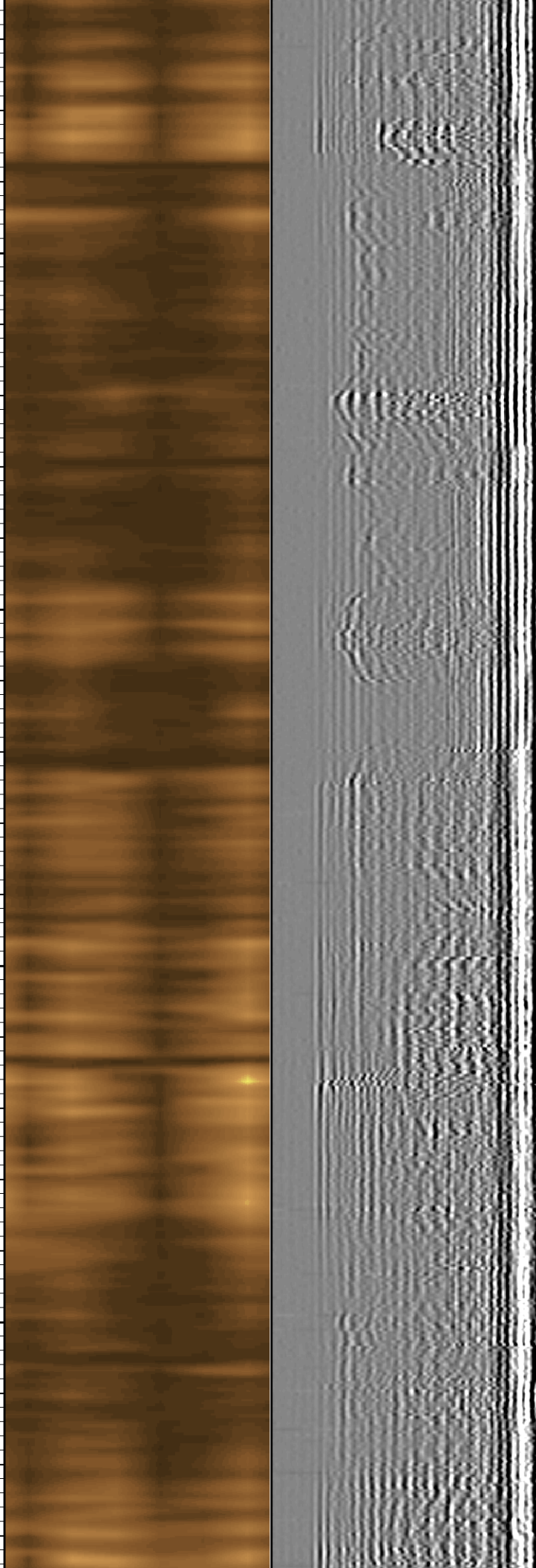
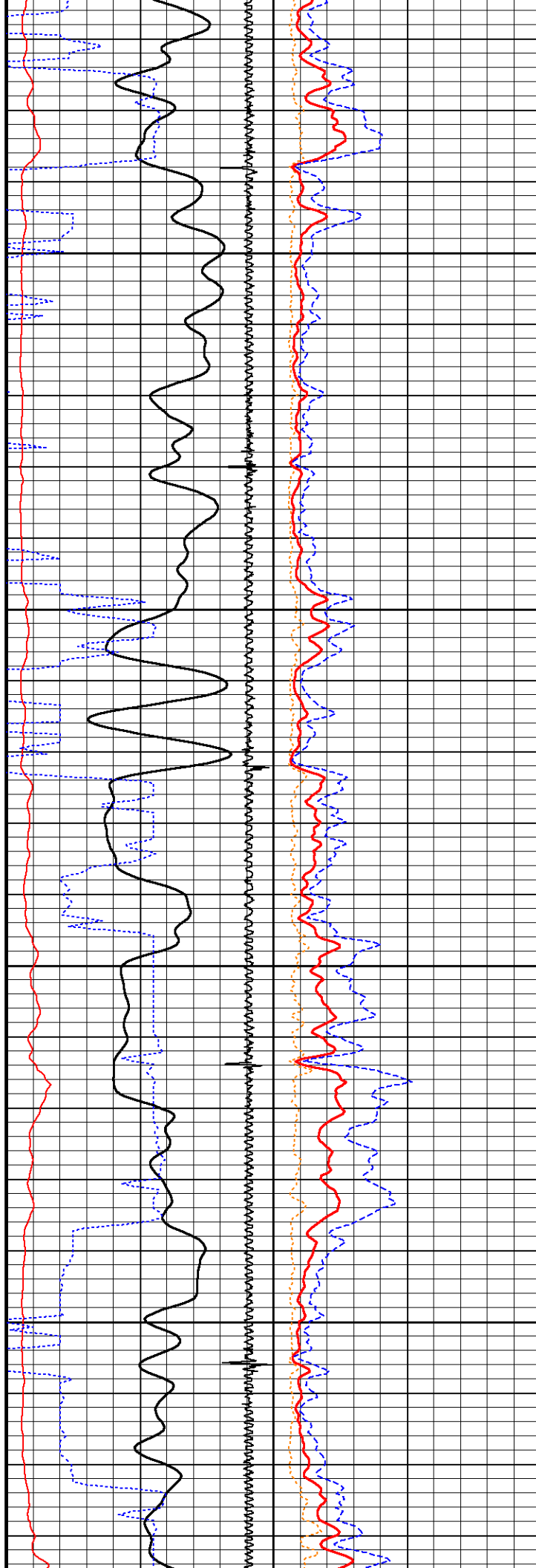
6550

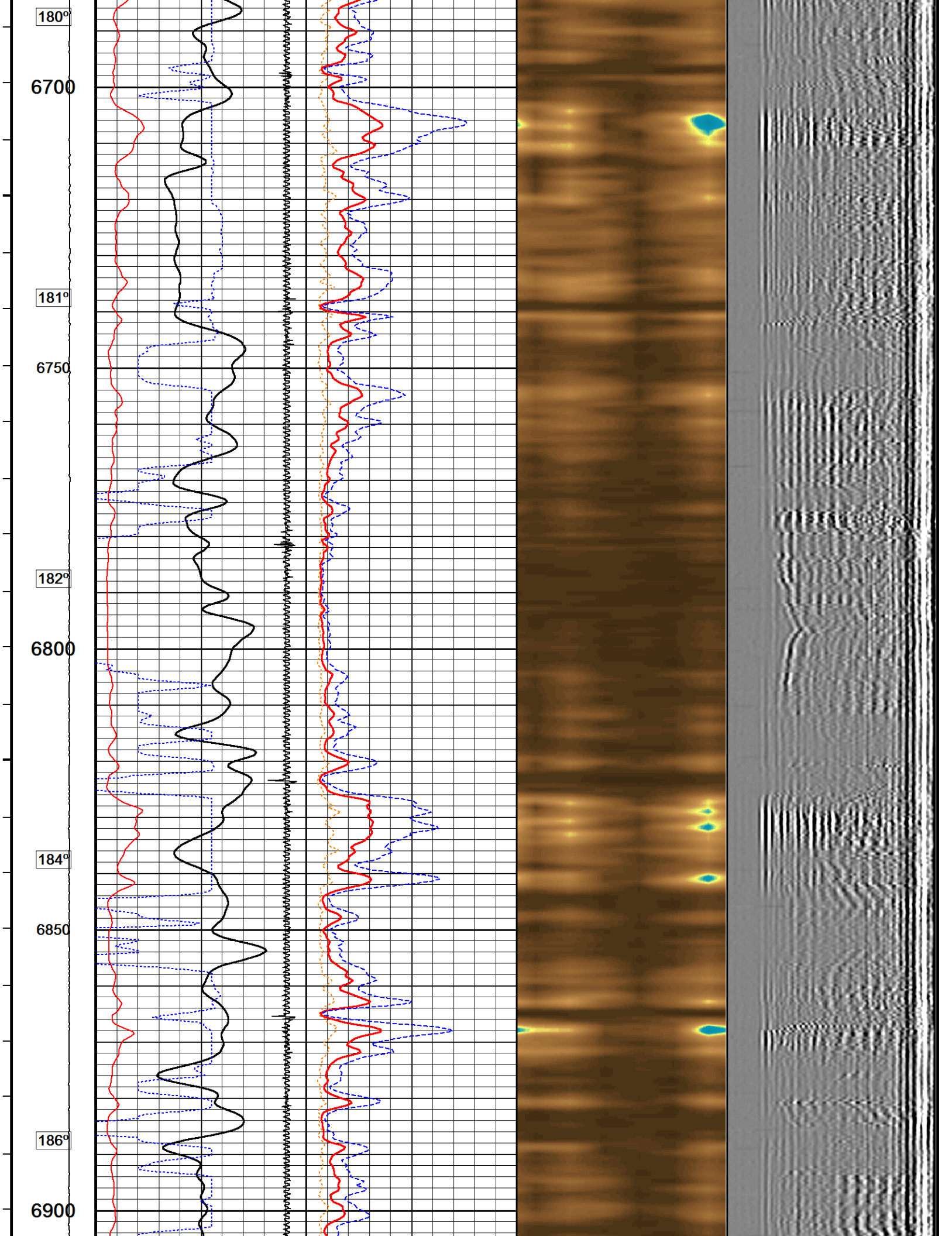
178°

6600

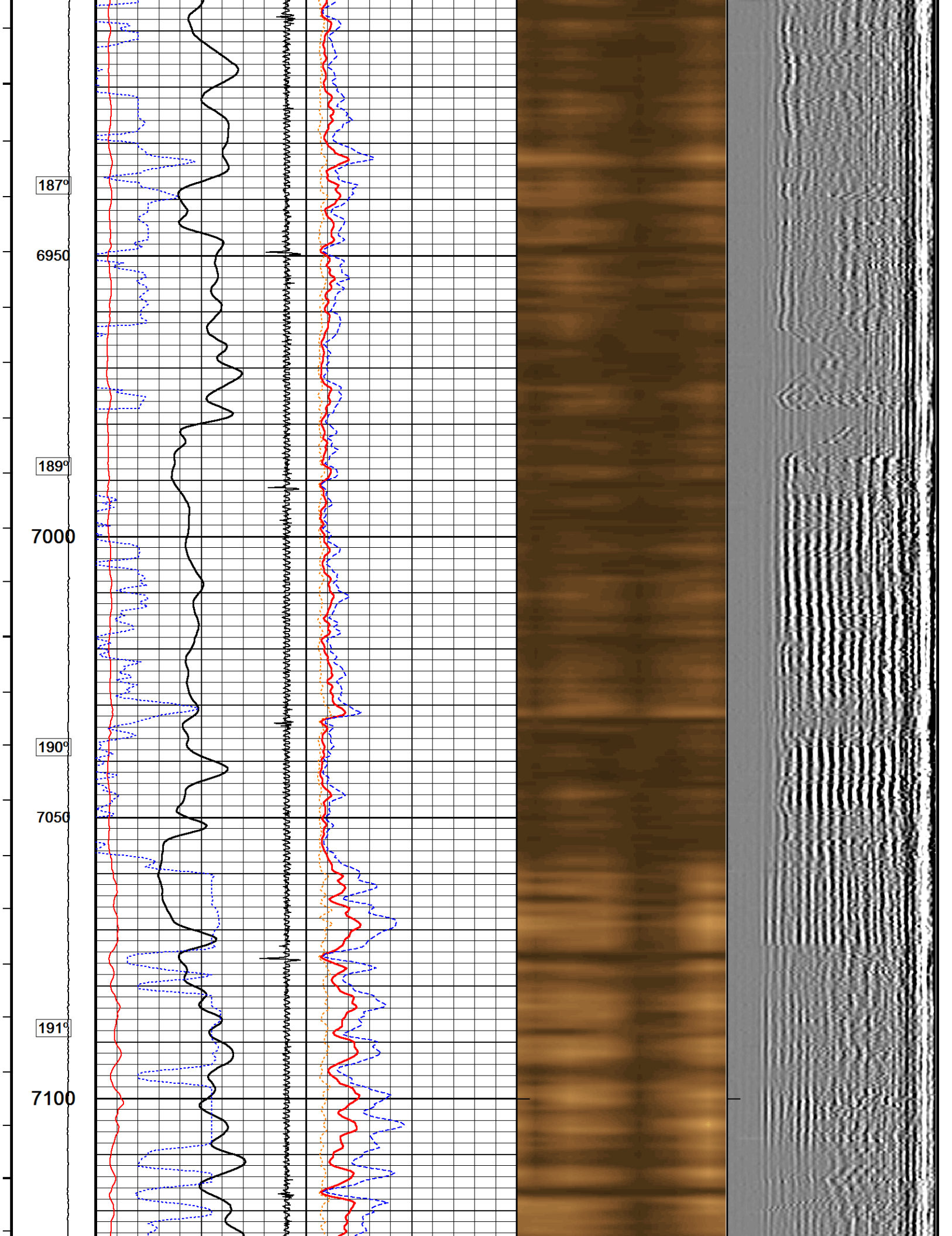
179°

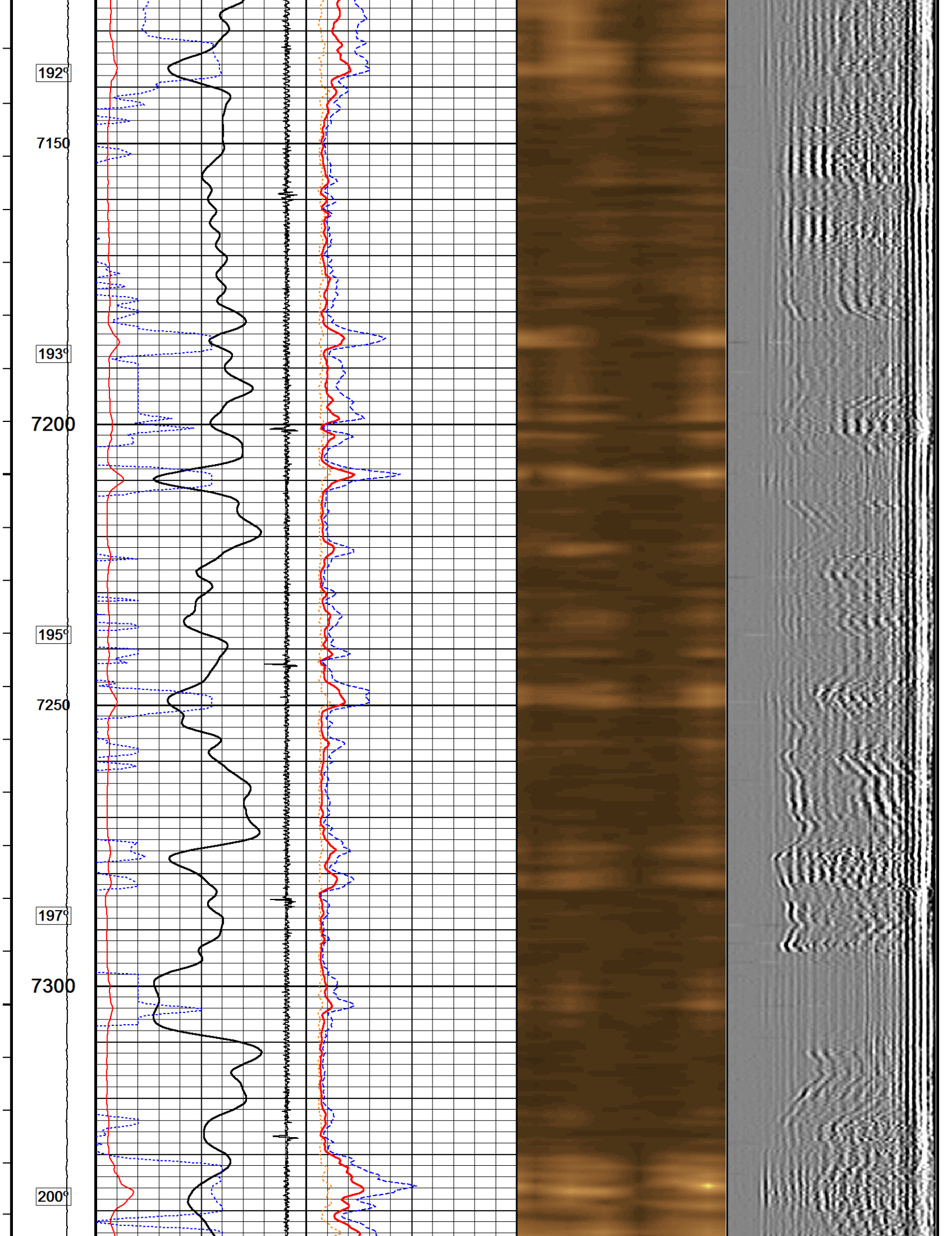
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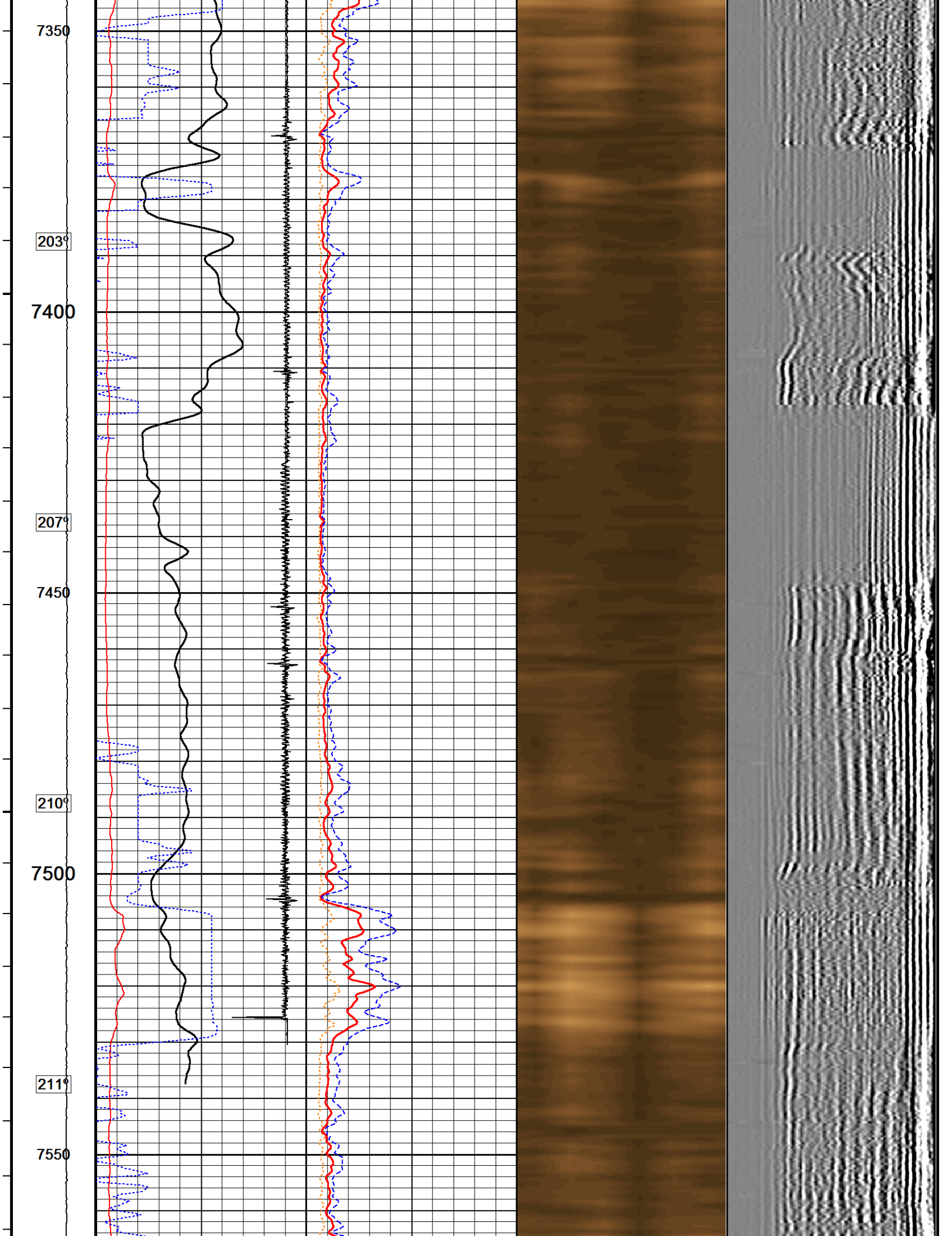




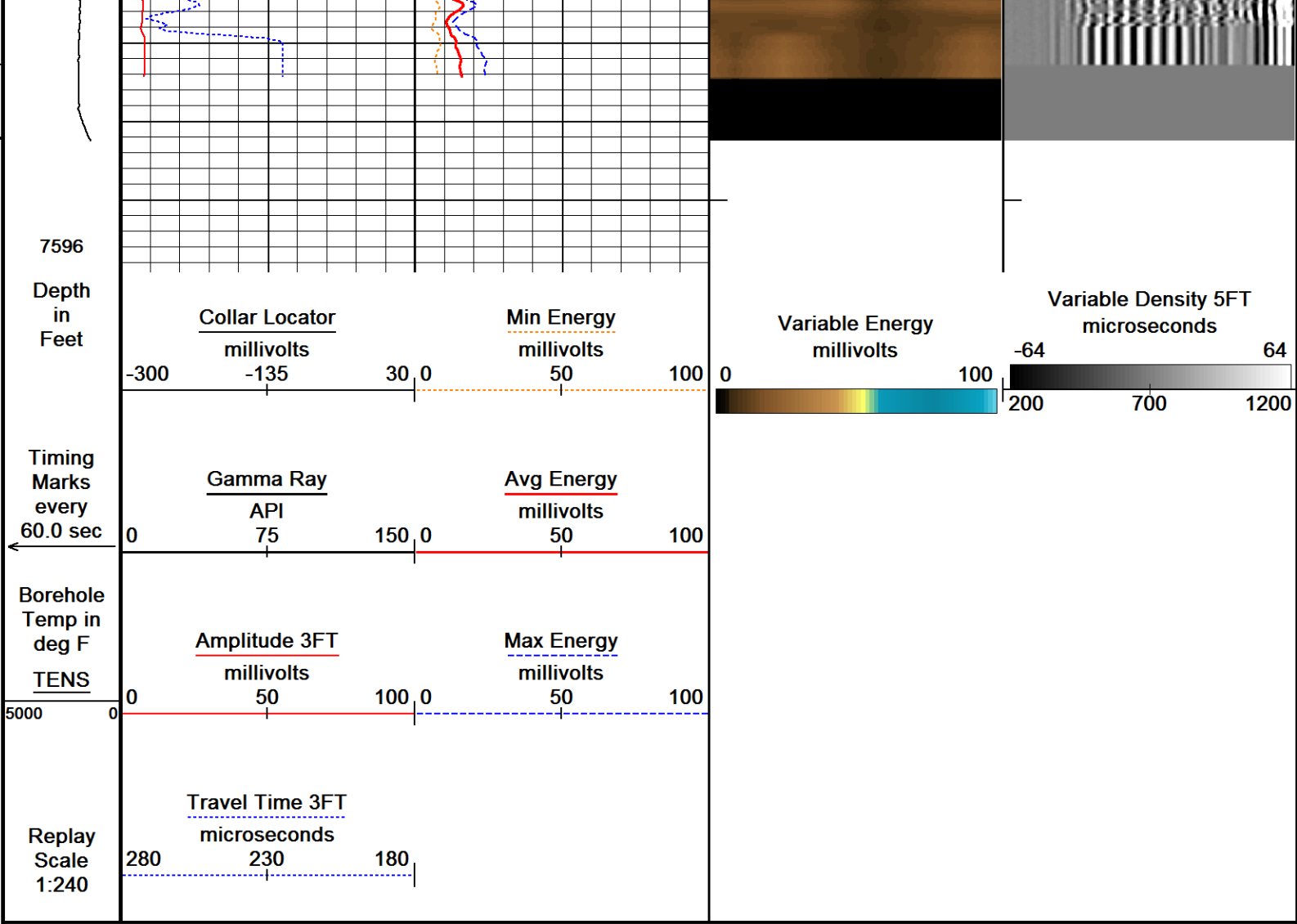












Depth Based Data - Maximum Sampling Increment 12.5cm  
Filename: C:\Logs\CRE\Vanguard\Logging\_24D\ssb\_main.dta  
System Versions: Processed with 17.05.6573 Plotted with 17.05.6573

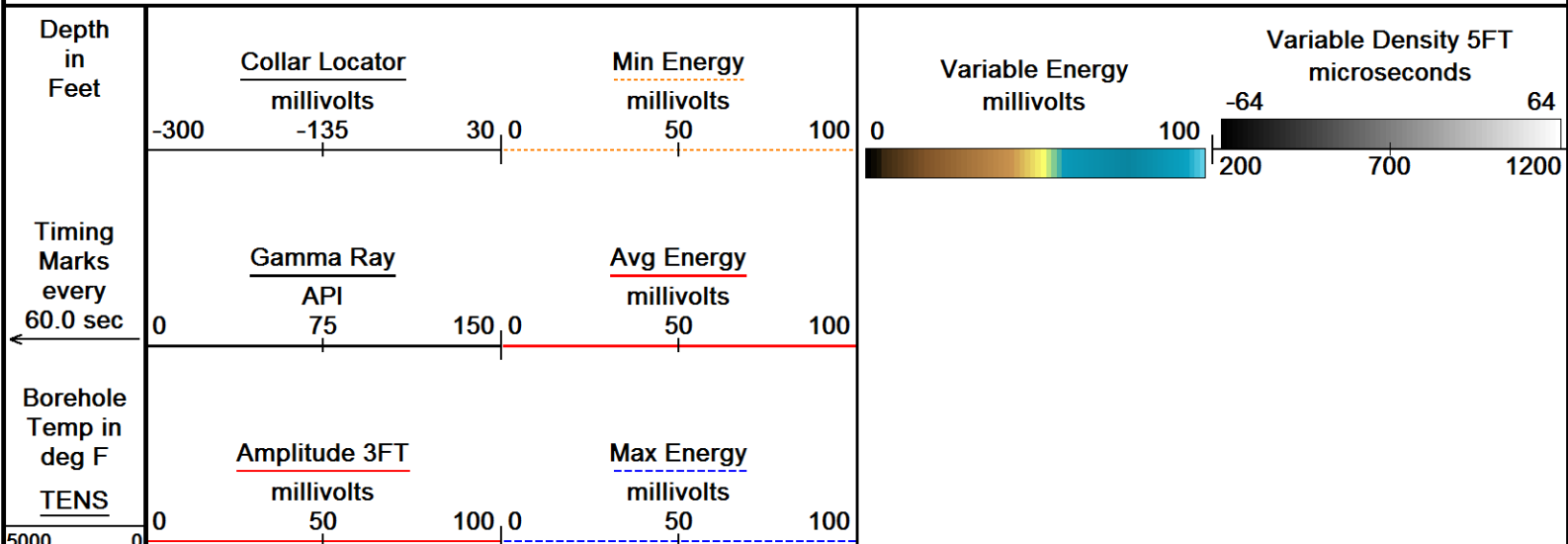
Plotted on 30-DEC-2017 19:02  
Recorded on 30-DEC-2017 09:37

↑ MAIN PASS ↑

↓ REPEAT PASS MAIN PASS ↓

Depth Based Data - Maximum Sampling Increment 12.5cm  
Filename: C:\Logs\CRE\Vanguard\Logging\_24D\Van\_GGU13-28\_24D\_mp\_001.dta  
Filename: C:\Logs\CRE\Vanguard\Logging\_24D\ssb\_main.dta  
System Versions: Logged with 17.05.6573 Plotted with 17.05.6573

Plotted on 30-DEC-2017 19:02  
Recorded on 30-DEC-2017 16:39  
Recorded on 30-DEC-2017 09:37





Replay  
Scale  
1:240

Travel Time 3FT  
microseconds

280 230 180

3700

120°

3750

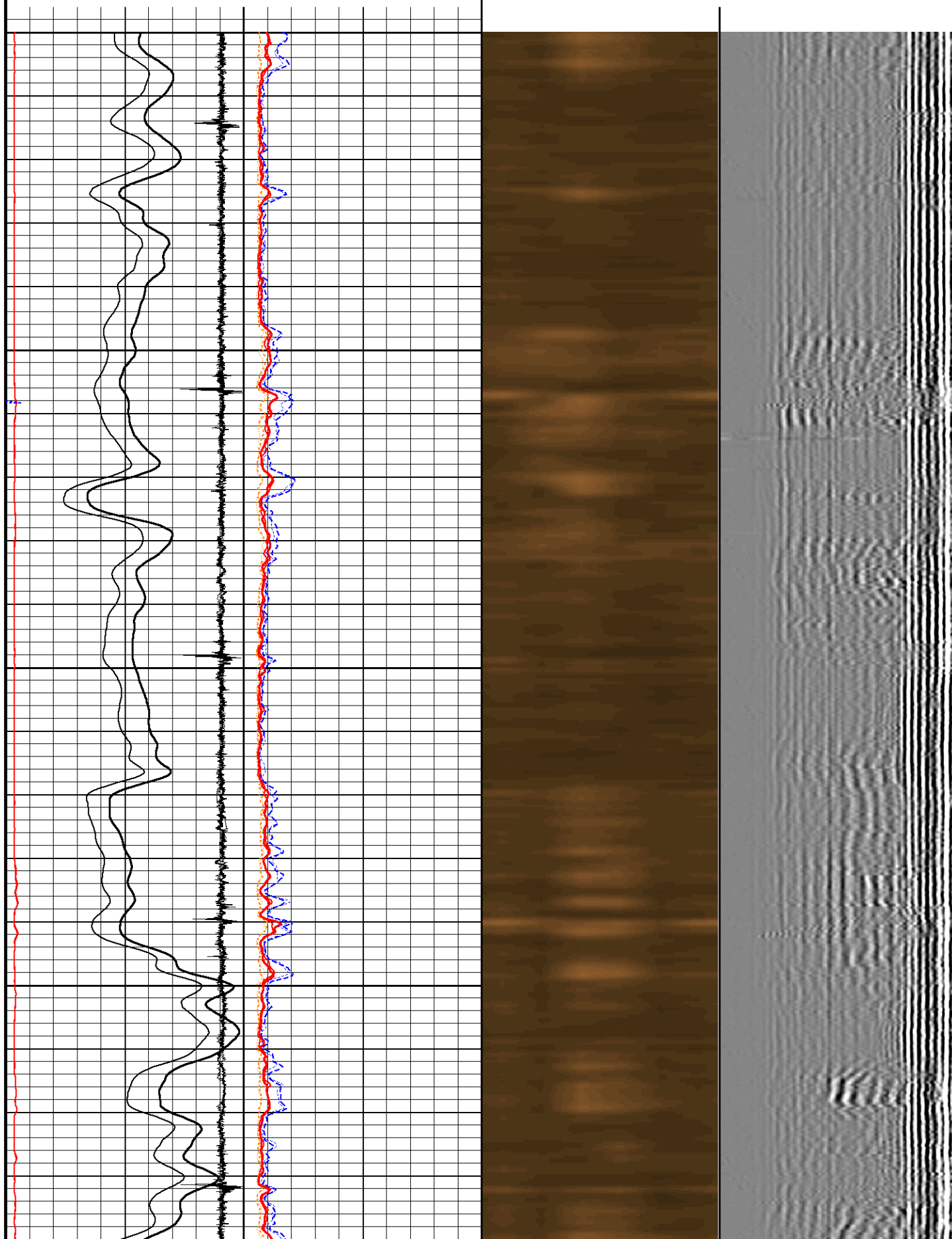
121°

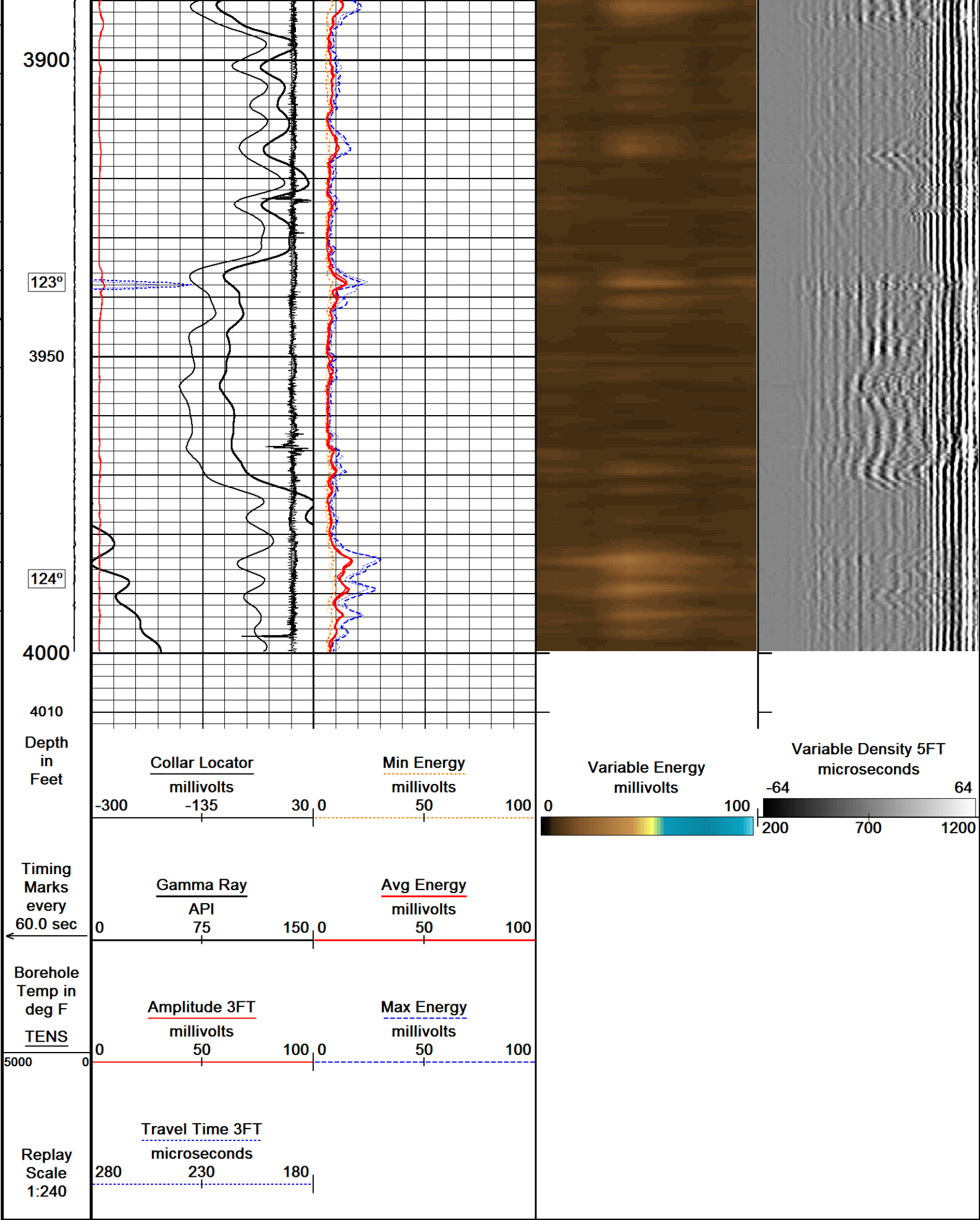
3800

122°

3850

123°





SHOP AND FIELD CALIBRATIONS

C:\Logs\CRE\Vanguard\Logging\_24D\ssb\_main.dta

WCC Shop calibration    WCC-CB 136

Calibration on 00-JAN-1988 00:00

Tension Compression Shop calibration

Tool Type: WCC-CB                      Serial No: 136

	Standard	+1G Measured	Standard	-1G Measured
X Acc	1.000 G	3664.0 mv	-1.000 G	1281.0 mv
Y Acc	1.000 G	3699.0 mv	-1.000 G	1315.0 mv
Z Acc	1.000 G	3705.0 mv	-1.000 G	1300.0 mv

UGK Before Survey Cal    UGR-KA 109

Field calibration on 01-DEC-2017 14:55

Gamma Ray Before Survey Calibration

Tool Type: UGR-KA                      Serial No: 109  
Calibrator No: 101

Background	Calibrator	Standard	Units
65.1	860.4	470.2	API
Delta Counts Per Sec: 795.3		CPS/API = 1.691	

Temperature Tool Shop Survey Calibration    TMP-NA 139

Temperature Tool Shop Survey Calibration

Tool Type: TMP-NA                      Serial No: 139

calibration		
Standard		Measured
32	DEGF	36714 Hz
212	DEGF	50849 Hz

UGK Before Survey Cal    UGR-KA 144

Field calibration on 01-DEC-2017 14:38

Gamma Ray Before Survey Calibration

Tool Type: UGR-KA                      Serial No: 144



Background	Calibrator	Standard	Units
55.1	833.1	470.2	API
Delta Counts Per Sec: 778.0		CPS/API = 1.655	

SSBC Field Calibration SSS-CA 125

Field Calibration on 28-DEC-2017 09:48

Slim Sector Bond Field calibration

Tool Type	SSS-CA	Serial No	125
Sensor	Description	Standard	Measured
AMP 3FT	100% Bond	3.50	0.30
	Free Pipe	81.00	2634.20
AMP 5FT	100% Bond	0.40	0.20
	Free Pipe	54.00	2092.60
1 SECTOR AMP	100% Bond	5.00	0.00
	Free Pipe	95.00	448.80
2 SECTOR AMP	100% Bond	5.00	0.00
	Free Pipe	95.00	527.80
3 SECTOR AMP	100% Bond	5.00	0.00
	Free Pipe	95.00	518.90
4 SECTOR AMP	100% Bond	5.00	0.10
	Free Pipe	95.00	533.90
5 SECTOR AMP	100% Bond	5.00	0.20
	Free Pipe	95.00	593.90
6 SECTOR AMP	100% Bond	5.00	0.00
	Free Pipe	95.00	518.30

SSBC Constants SSS-CA 125

Last Edited on 00-JAN-1988 00:00

Min Ampl 100% Bond	3.51 MV
Max Ampl 0% Bond	81.03 MV
Casing Size	4.50 IN
Casing Weight	11.6 LB/F
3' TT Correction	0.0 US
DT Fluid	204.0 US/F
Fast Formation TT	38.5 US/F
Cement Cmpr Strength	600 PSI
Casing Velocity	57.00 US/F
Maximum Attenuation	12.00 DB/F

SMS Constants SMS-A 0

Last Edited on 00-JAN-1988 00:00

Cement weight

0.00 LB/G

## DOWNHOLE EQUIPMENT

C:\Logs\CRE\Vanguard\Logging\_24D\ssb\_main.dta

Mono-Cablehead

MCH-AA 0 LG: 1.03 ft WT: 2.2 lb OD: 1.457 in

Comm Sub

WCC-CB 136 LG: 5.97 ft WT: 24.3 lb OD: 1.693 in

Centroller, 43mm, ITB, 3-arm Bi-Direct

CR3-BA 137 LG: 2.51 ft WT: 8.8 lb OD: 1.693 in

Gamma Ray K

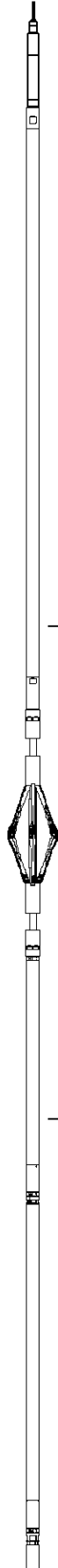
UGR-KA 109 LG: 2.34 ft WT: 17.6 lb OD: 1.693 in

CRE series II processor section

CRP-BA 129 LG: 3.31 ft WT: 15.4 lb OD: 1.654 in

Casing Reservoir Evaluation Tool Sonde

CRM-BA 128 LG: 3.10 ft WT: 16.3 lb OD: 1.693 in



52.34 ft CCL - Collar Locator

47.39 ft GR - Gamma Ray

CRM-BA 129 LG: 9.19 ft WT: 48.5 lb OD: 1.693 in

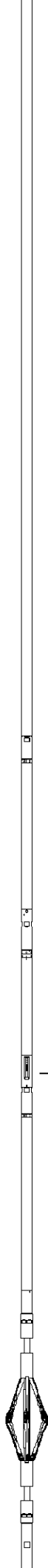
Quartz Press, Dual ITB, 43mm  
QPG-EA 141 LG: 2.23 ft WT: 8.8 lb OD: 1.693 in

Tool Temperature, 43mm, 177C, 10-pin ITB  
TMP-NA 139 LG: 1.93 ft WT: 8.8 lb OD: 1.693 in

Gamma Ray K  
UGR-KA 144 LG: 2.34 ft WT: 17.6 lb OD: 1.693 in

Centroller, 43mm, ITB, 3-arm Bi-Direct  
CR3-BA 107 LG: 2.51 ft WT: 8.8 lb OD: 1.693 in

SSB Upper Electronics, ITB  
SUE-CA 105 LG: 7.64 ft WT: 26.5 lb OD: 1.654 in

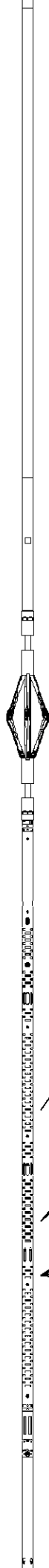


30.49 ft TMPN - Temperature



Centroller, 43mm, SSB, 3-arm Bi-Direct  
CR3-DA 110 LG: 2.83 ft WT: 6.6 lb OD: 1.693 in

SSB Receiver Sonde  
SSS-CA 125 LG: 8.97 ft WT: 37.5 lb OD: 1.690 in



10.05 ft VDL5 - Variable Density 5FT

9.05 ft TT3F - Travel Time 3FT

9.05 ft AM3F - Amplitude 3FT

8.55 ft AAVG - Avg Energy

8.55 ft AMIN - Min Energy

8.55 ft AMAX - Max Energy

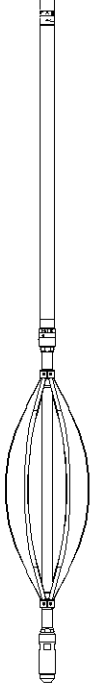
8.55 ft VAMP - Variable Energy

SSB Transmitter Section  
STE-BA 139 LG: 2.64 ft WT: 17.6 lb OD: 1.654 in

Centralizer, 43mm, ITB, bi-directional  
CEN-PA 399 LG: 3.00 ft WT: 8.8 lb OD: 1.690 in

Bull Plug, 10-pin ITB, 43mm, NO TERM  
BUL-HA 0 LG: 0.08 ft WT: 0.0 lb OD: 1.693 in

Total Length: 58.50 ft Weight: 255.7 lb



0.00 ft TENS - Tension  
Tool Zero (0.00ft from bottom)

All measurements relative to tool zero.

COMPANY	VANGUARD OPERATING LLC.
WELL	FEDERAL GGU 24D-28-691
FIELD	MAMM CREEK
PROVINCE/COUNTY	GARFIELD
COUNTRY/STATE	U.S.A./COLORADO

Elevation Kelly Bushing	6147.6	feet	Bottom Log Interval	7568.00	feet
Elevation Drill Floor		feet	Depth Driller	7660.00	feet
Elevation Ground Level	6130.6	feet	Depth Logger	7578.50	feet



**Weatherford®**

SECTOR  
BOND